GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

The Carbonization Conference.

It was a happy thought that resulted in the Carbonization Conference organized by the Joint Fuel Committee—composed of the Institution of Gas Engineers, the Coke-Oven Managers' Association, the Society of Chemical Industry, and the Institute of Fuel—being held in Birmingham at the time of the British Industries Fair, where so much that claims the use of fuel of one description or another was on view. Apart from the Fair, Birmingham is the birthplace of many of the fuel problems which to-day confront the technologists who specialize in fuel production and utilization. We have only to mention Watt and Murdoch to establish the claim of the city, in which much has been done, since the days of those famous men, to assist in the elucidation of those problems. For very many years, the Corporation Gas Department have been making good contribution; and their capacity for doing so was seen by the delegates at the conference on their visit to the gas-works, and more might have been learned in the Industrial Research Section of the Department, had time permitted. It was in these works that the Hon. Secretary of the Joint Fuel Committee (Dr. E. W. Smith) had his opportunities for large practical research.

The conference demonstrates the progress that has been made in the pooling of talent, research, and experience by the technical men of the various industries concerned in producing and applying fuels—gaseous, liquid, and solid. As Sir Richard Threlfall, the Chairman of the Fuel Research Board, said at the meeting of the conference, at one time only a few isolated people could be found who would take an interest in the scientific aspects of fuel. The conference, however, proves that at length the study of fuel has come into its own; but this has only happened, and has been in process of development, through a recognition of needs, and the activities of the more ardent and enterprising spirits among us during the last few years. The Fuel Section of the Society of Chemical Industry, the Institute of Fuel, the developments at our universities and other centres of learning (in which Leeds, with the Institution of Gas Engineers, was in the van), and the Committees established by our colliery and coke-oven interests, with the Fuel Research Board and Station as the central national organization, are all, relatively speaking, of modern growth. And the quest has an economic objective. One great benefit of such conferences as that of last week is that they unite the research workers into fuel problems and those who are in technical charge of the utilization of fuels in our industries. It is not enough in these times that an industry should produce a fuel, and put it into the market place; the producer has to penetrate into the problems of its utilization, and for more reasons than scientific advance. The value of collaboration was emphasized by Dr. G. C. Clayton, M.P., at the opening session, when he remarked that the importance of research into fuel problems does not require emphasizing; but the equal or even greater importance of applying the great mass of information which exists on fuel utilization has not received the same accentuation. There is an abundance of information already available which, if applied, would represent, in the aggregate of its effect, a surprising economy to the industries and the country; and yet problems are before us which remain to be solved, while each solution brings into view fresh avenues for exploration. Sir Richard Threlfall expressed surprise that, after an experience of carbonization work over a century-and-a-quarter by the gas industry, there should still be so much scope for research. We plead guilty to the politely put indictment. Until (say) the beginning of this century, we were too empirical, and had not sought the aid of science as we ought. That has been, as has since been proved, to our disadvantage; and, confessedly, had we had recourse to scientific research a century ago, our progress would have been still more conspicuous, and the course of fuel affairs would have been vastly altered. Even then we should not have exhausted, by this time, the scope for research. Prof. Arthur Smithells, the Chairman of the Joint Fuel Committee, declared, in alluding to Sir Richard's surprise, that the field for fuel research in these days was so wide that the limits are practically boundless—at any rate, that is how he and how we of the gas industry who have studied the matter view the fuel prospect to-day. All the more reason why the technical men of the carbonizing industries should get together, for there is no question, as Dr. Clayton remarks, that progress will be stimulated by freer interchange of data and experience.

The whole of this work will be of ultimate benefit to the public—indirectly it may be, but it will be real. There should also be a direct benefit by the dissemination of the pronouncements of competent men—statements based on scientific, and not financial, interest. Prof. Smithells gave utterance to the views of many of those at the conference when he said that he felt there was at the present time cause for anxiety and alarm that the public should be so much at the mercy of those who made explicit and definite statements, with great confidence and publicity, on some of the most difficult questions connected with fuel. And he added: "From a conference such as this, "the public, through the Press, ought to get some clear "idea as to how far problems have been solved, and "should be put on their guard against putting their belief "and money into enterprises concerning which over-"confident statements are made and claims put forward which, in the present stage, cannot be justified." Dr. Clayton, too, declares that there are certain sections of the fuel industry which still evince an amount of hesitation in placing all their cards on the table. However true that may be, the gas industry has to keep its eyes not only on the immediate future, but on the prospects of a time which may be more or less remote. Policy must fit the

times, but there must be as clear a conception as we can form as to the possibilities beyond. Sir Richard Threlfall, speaking of low-temperature carbonization, said: "The whole problem of the carbonization of coal at low "temperature is only, so to speak, of intermediate interest; "for in the future, I suppose, gas will be generally used— "eventually we shall come to gas and electricity—and "anything in between will merely assist the intermediate "stage of removing the reproach of befouling the atmo- "sphere with smoke." That is much what the gas industry is anticipating; but the road is long to the state of universal gas heating; and work has to be done as quickly as possible to stop waste and the ill-effects of air pollution. And fuel technologists and the gas industry are making exploration to see what can readily be done to subscribe to the requirements of what Sir Richard calls the "intermediate stage." Some men think that there need be no intermediate stage; that all that is required is something revolutionary. They are visionaries, and their very advocacy proves them to be out of joint with practical needs and popular views.

There is one thing we should like to emphasize, and it is that at such fuel and carbonization conferences as the one held last week in Birmingham, it is highly necessary that as many as possible of the scientific workers on the carbonizing and fuel problems of our industry should be there to contribute to the discussions. Only by sufficient representation and participation can we assure our place in the large and powerful movements that are being made at the present time. The gas industry must not overlook the inter-relations that are developing in the fuel industries, and in which it must have part. Points in the proceedings at the conference to which we shall refer in another article will confirm this.

[It should be mentioned that, by official desire, our report of the discussion is being submitted for revision to each speaker. This takes time; but we hope to publish, as a supplement to the "JOURNAL" next week, the first instalment of the report.]

The Gas Section at the Fair.

WHEN this issue of the "JOURNAL" reaches our subscribers, there will be only two full days left for those who have not yet had an opportunity of visiting the British Industries Fair, Birmingham, to inspect the remarkable demonstration which has been made in the Gas Section. Success has been marked both in the quality of demonstration, and in the attraction it has been to gas administrators, engineers, managers, salesmen, and, in fact, to men operating in all spheres of our many-sided industry; and not only to them, but to men engaged in other industries and trading. Wednesday of last week was a day on which representatives from the various spheres of gas enterprise were entertained at luncheon by the Exhibition Authorities, and that day particularly showed how extensive has grown the co-operative feeling in our industry in the effort to advance its interests. The following day Their Majesties, the King and Queen, viewed the great display, including the Gas Section. They evinced a close interest in all they saw, and incidents in their progress were evidence of intimate acquaintance with the service that gas renders to the whole community wherever residing—from palace to cottage. Our French colleagues who were there on Tuesday were delighted with all they saw, and highly gratified by the welcome extended to them by their colleagues at Birmingham. Our first impressions of the Gas Section have been fully confirmed by later ones. It is in every contributory part a demonstration of the high ideals of our industry, and of the excellent standards in efficiency, utility, and finish to which our manufacturers have brought their products. It is also a grand illustration of the enormous range of application which the primary and secondary products of the industry have reached in the service of mankind and production generally, and which can and will be greatly extended. The very variety of use is a perfect stronghold. As the descriptive account which appeared in the "JOURNAL" last week testifies, there is much in the Section to engage the gas producer as well as the gas seller. We are confident that, although now the life of the display is drawing to a close, there will be many among our readers who will take the final opportunities of paying a visit. In the Fair the gas industry has taken its place among the other leading industries of the country, and it has proved its right to be there.

Matters of General Concern.

THERE was a strong commercial tendency, with just sufficient technical leavening to heighten interest, in the address which the President of the South Metropolitan Gas Company (Dr. Charles Carpenter) delivered to the proprietors last Wednesday. There is no point in it which does not concern every man in the gas industry. The speech is another reflection of the restless change in the trading circumstances of our industry, and of the modern problems with which its responsible administrators and managers have to deal. They have to be ever alive to all that is transpiring; for the mutations in circumstances which command attention are not all of internal growth, but are imposed upon the industry by conditions external to it. Who would have thought at one time that municipal ownership of electricity undertakings would have influenced design in housing schemes, and would have induced some borough councils to attempt to divest the tenants of the houses of their free will in the matter of purchasing the agent for light and heat which they consider preferable? We are glad Dr. Carpenter dealt with this question, and in the way that he did—with due seriousness, and yet interspersed with a modicum of sarcasm to accentuate the foolishness and the injustice of the municipal powers who seek to dominate the purchasing freedom in this particular of their tenants. Municipal councils about the country who think they have a right to do this, but would strongly resent anything of the kind being inflicted upon them individually, will perhaps take heed of what Dr. Carpenter says in this regard. The South Metropolitan Company are largely, though not wholly, fortunate in this matter. We need only mention the Eltham Estate to prove experience of the one type of municipal authority, and to refer to the statement of the President to illustrate experience of the perfectly unprejudiced and independent authority. And here we have evidence of the fact that it is municipal trading in electricity which alone has created the new policy of compulsory patronage of a commodity on local authority housing estates. The London County Council are not public suppliers of electricity. Last year the Company enrolled 4400 new consumers, many of whom live on the housing estates which are being developed by the Council. Most of these consumers are "all-gas" ones, for the reason that they prefer it, and the County Council are broad-minded landlords. This cannot be said for all municipal landlords, who can have no genuine ground for complaint if their tenants rebel, and seek to re-establish their right to place their custom where they please, secure what they prefer, and realize more economical and efficient service. Much the same policy, as was pointed out by Dr. Carpenter, obtains in respect of public lighting. Municipal electrical ownership uproots street gas lighting, expensively establishes electric lighting, and so does harm to a heavily rate-burdened gas undertaking, and injury to the ratepayers by subjecting them to less efficiency, and, as is frequently proved, to an unstable source of illumination. In this case, local government has instituted a fresh line of policy. Its functions in respect of public lighting are now assumed to be limited to consideration for the electricity undertaking; and it discredits itself by an unfaithfulness to the interests of the ratepayers in this vital element in street efficiency. In South London, the wonderful demonstration of high-pressure gas lighting as favoured by the large emporia and other tradespeople stands as a rebuke to the administrative transgressions of the electrically governed local authorities.

Private enterprise has its claims; and when it operates in an area with such generous regard for a high standard of service as is demonstrated by the Gas Company in South London, which is appreciated by the consumers, there is the more reason why the local authorities should do their utmost to encourage it—realizing that it is their duty to advance, and not to repress, public service. No gas company could have done more than have the South Metropolitan Company in promoting efficiency for the consumers of gas by research into the details of gas-using

appliances, and applying the successes to their improvement, with the result that not only is thermal efficiency high, but working efficiency has also accrued. The greatest defence of the gas business is through service and satisfaction. It is such work on gas-using appliances which enables Dr. Carpenter to say "in a trial made between a standard type of cooker and an electrically operated one, we came out the winner."

The Company are instituting another change which is in accord with modern tendency. There is a great deal to be said in favour of monthly gas accounts, save in respect of the additional labour entailed. But consideration of what the President had to say may show that means of modifying this exists. The gas industry has to take two matters into account in deliberating over the question of more frequent collections. The one is that the larger proportion of ordinary consumers receive their salaries monthly; the other is that, if we want to develop domestic heating among them, we must render an account of their indebtedness at shorter intervals and when most convenient to them, and not spring surprises on them at the end of each winter quarter. The policy of shorter collections is, in the circumstances of increasing individual consumption, a sound one. In this connection we rather think there will be a desire on the part of some gas administrators who are considering the matter to have a little further information regarding the nature of the arrangements which have been made with two London banks, who are co-operating with the Company, by placing their banking facilities at disposal for the collection of the accounts. The Directors of the Company are manifestly pleased over the scheme with the bankers, seeing that Dr. Carpenter said: "I should like publicly to acknowledge "the sympathetic manner in which these large organiza-"tions responded to our overtures for their co-operation."

Reference was also made in the address to the investigation in which the Company's officials, in conjunction with the Institution of Gas Engineers, have been taking part. The work concerns the endeavours to determine the penetration into the human skin of various forms of light and heat radiation, to enable some conception to be formed as to what is meant by "comfortable heat." An installation of apparatus for the purpose has been made at Treloar's Cripple Homes, at Alton. It is used as an integral part of the radio-therapeutic treatment of tuberculosis patients, in which they are flooded with heat rays from gas. Sir Henry Gauvain, the Medical Superintendent at the Homes, is directing the work; and it holds out promise of good result.

On the subject of secondary products, the President was also interesting. He is a strong advocate of coke being produced of equal quality throughout the year; and the Company are working in this direction. They have also placed upon the market a coke grate, fitted with a burner in which gas is used as an igniter. Low-temperature carbonization has not by any means been finally abandoned by the Directors. As a matter of fact, their opinion is that all crude coal should be first treated at the gas-works for the production of gas or solid fuel; and, having this in view, the time is not yet ripe to say that a low-temperature plant would not be valuable as an auxiliary. Thus there is a possibility of a system on the working scale being tried at the East Greenwich Works.

There were several other points in the address. But they all go to show that change and development in the gas industry are general, and that there never was a time in its history when clear understanding and keen and widely adaptable administration were more necessary than now. The proprietors of the South Metropolitan Company realize this. They also appreciate that the growing necessities of their business require new capital. Hence a unanimous authorization to the Directors to promote a Bill which, among other desired sanctions, seeks an enlargement of capital powers.

The Wrecked Holders at Manchester.

ANOTHER stage has passed in the attempt to solve the mystery of the wrecking, on Aug. 23 last, of two holders at the Bradford Road Gas-Works of the Manchester Corporation. The Inspector appointed by the Home Office (Mr. Frederick Owen Stanford, M.Inst.C.E., one of the Engineering Inspectors of the Ministry of Health) resumed the public inquiry last Thursday, but meantime he has been privately pursuing his investigations. The position is that we are still in the realm of theory regarding the actual causes of the collapse and the means by which the escaping gas became ignited. The process that is being followed, and the only one adaptable to the circumstances, is that of discarding theories which discussion has proved to be untenable; and probably the nearest approach we shall get to actual solution is by the "survival of the fittest" theory. At the resumed inquiry last Thursday, Mr. William Newbigging was recalled; and Alderman T. Cook, Chairman of the Gas Committee, Mr. Alfred L. Holton, and Mr. C. S. Shapley also supplemented evidence or submitted opinions. Nothing really definite transpired—indeed, it is difficult to extract anything positive from such an entanglement of conditions and wreckage. We must therefore await the report of the Inspector, whose private research is not yet complete. The statements made on Thursday seem to indicate his view that he has his doubts regarding the internal condition of the metal work, and that there had been a weakening of the metal. During the interval between the two sittings, Mr. Stanford has taken samples of the metal from the gasholders, and has submitted them for testing to the National Physical Laboratory. In doing this, he deliberately, and properly, took metal which showed signs of weakness. Consequently, the results came out somewhat lower than those of the tests made by Prof. T. L. Rhead, though, making allowance for the differences in the samples of material tested, there is, according to Mr. Newbigging, fair ground for saying that, generally speaking, the reports confirm one another. The Inspector has asked that, when the wrecked holders are being dismantled, the work shall be done with care, so that the inner rollers and their guides may be critically examined. The position in which matters were left at the close of the inquiry suggests the possibility of the finding that time and service had weakened the internal metal work, and that this was the primary cause of the collapse. If this is so, then it will open up a vista of research for the industry to ascertain whether the nature of the metal itself or the changed conditions of gas making, or both acting in combination, subscribed to the weakening to a degree to bring about collapse. It is a point which involves much, but upon which we will not dilate. How the escaping gas came to be ignited seems capable of being the subject only of theory. Sparking at the time of the collapse is apparently the most favoured explanation. It has been suggested to the Inspector by a correspondent that atmospheric electricity might have had something to do with the ignition; but Mr. Stanford, after consultation with the Meteorological Office, is obviously somewhat sceptical regarding the idea.

Coal-Selling Organizations.

THE coal-marketing scheme for Yorkshire, Nottinghamshire, and Derbyshire has now taken definite shape. On Tuesday of last week, a Central Collieries' Commercial Association was inaugurated at a meeting, in Sheffield, of the Executive Council and Operating Committees. Representatives of the coalowners of Lancashire and Cheshire, Cannock Chase, North Staffordshire, Warwickshire, South Staffordshire, and South Derbyshire were also present. For these areas District Associations are to be formed, and then they will become members of the Central Association. In this way the whole of the Midlands will be covered, and coal-selling be subjected to regulation. The Chairman of the Central Association is Mr. W. Benton Jones, who is Chairman of the South Yorkshire Coal Trade Association and of the United Steel Company, Ltd. The three main Committees, who have to deal with basic tonnage, the quota, and exports, have begun their work. Regarding the South Wales Coal-Marketing Scheme, the classification list, together with the suggested minimum prices, has been issued to the members of the Association. Rumour says there has been very little change regarding classification; and the following figures are indicated as the initial minima in the various groups: Best large coal, 19s.; ordinary

Cardiff large, 18s. to 18s. 9d.; best drys, 18s.; ordinary drys, 17s. 3d. to 17s. 6d.; small, 10s. 6d. to 13s.; through coals, 15s. to 16s. 6d. It must be borne in mind that these are minimum prices, and that quotations are not likely to rest often on the basic line, but will, as a rule, be above it.

Makers of Markets.

THE members of our Royal Family are keen observers and students of the requirements of industries and trade, not only at home but abroad. Trade is a vital need of every industry; and the Duke of York, at the annual dinner of the Incorporated Sales Managers' Association on Tuesday last week—at which Mr. F. W. Goodenough presided in the absence of the President (Lord Burnham)—showed that he has a comprehensive appreciation of what is necessary for the cultivation of trade. The speech came at an opportune time with the British Industries Fair in full swing both at London and at Birmingham, which in itself witnesses a more spirited energy and will to cultivate trade here and beyond the seas. There is good omen in this. But there still lingers in far too many industrial minds the old tradition or convention which is hard to destroy, that the greater importance is on the side of production, and that trading is secondary—that the one is more dignified and requires more skill than the other. That is a fallacy which must be utterly discarded, and the essentiality of production and salesmanship the one to the other must be recognized, and equality be established. That was the Duke's main theme; and it is well that it should be spoken of in high places, in order that the truth may be sent broadcast and have its effects. It is obvious that the men who secure and maintain the market for the goods from factories, whatever their character, are as vital as the men who produce them. We talk of mass production, of standardization, of the importance of reducing overhead charges; the greatest force in enabling these things to be brought about is the man who creates new business for the goods, and who assists in maintaining the fresh levels of demand. The Duke was right when he emphasized that what is wanted is the best men for both functions of producing and selling—the makers of goods and the makers of markets. Once we get that home universally, then we shall do better than heretofore. As in the technical or productive work of industry, so in salesmanship, aptitude must be accompanied by training to realize maximum efficiency. The requisite characteristics for the salesman are of varied order. They can be catalogued from the Duke's speech. There must be a profound understanding of human nature; a knowledge of the needs of the particular men and women with whom the salesman has to deal; insight, sympathy, and tact; patience, energy, and courage; faith and enthusiasm sufficient to inspire others, as well as to carry the salesman himself over times of depression and set-back; wise judgment and perfect integrity; brains, and first-class education. That is a sketch of broad needs; and we cannot find a single item which can be removed without impairing the whole. The speech is worth reading; and its salient features will be found reported in the "GAS SALESMAN" this week.

Institution Annual Meeting.

The full programme for the Cardiff meeting of the Institution of Gas Engineers is published in this issue.

Monthly Accounts.

The South Metropolitan Gas Company are preparing to adopt the system of monthly accounts for their consumers. The reasons for making a change were given by Dr. Carpenter in his address to the proprietors of the South Metropolitan Gas Company, as reported this week.

A Retrospective Reduction.

The Hornsey Gas Company appear to be highly successful in vieing with their large neighbours in the matter of lowness of price per therm to the consumers. They have announced a retrospective reduction from 9d. to 8d. per therm; this dating from the reading of the meters at Christmas. The 1d. per therm is equivalent to 5d. per 1000 c.ft.

Electrical Failures.

In our "Electricity Supply Memoranda" this week will be found another notable crop of failures of electricity supply. Our rivals in business have of late endured a somewhat miserable time through the inconstancy of the means of transferring their commodity to the consumers. The retailers of candles, however, have had reason to be thankful.

The Companies Bill.

The Companies Bill passed through the House of Lords last session; but its parliamentary career had temporarily to cease. It has been revived; and its second reading was moved in the House of Commons on Tuesday of last week by the President of the Board of Trade, Sir Philip Cunliffe-Lister. The Government have no intention of bringing the new Bill into force until an Act has been passed consolidating the new measure with the others that have gone before. One exception to this is clause 83 of the Bill, which seeks to deal with share hawking and share pushing. This provision will be brought into operation as soon as the Bill is passed. Second reading was obtained without a division.

Electricity Charges in London.

It looks as though the widespread complaints from various London boroughs regarding the prices of electricity are going to have some effect. The London and Home Counties Joint Electricity Authority have been considering the matter. A return which has been submitted to them showing the tariffs in existence throughout the district in October, 1927, exhibits wide differences in charges for like supplies. These, of course, may or may not be justified by local conditions. Nevertheless, there is, in the opinion of the Joint Authority, sufficient divergence between the charges to justify the suggestion that a comprehensive investigation should be made into the subject, although it may be desirable to postpone inquiry until after the settlement of standard prices for the Electricity Companies within the administrative county of London. The Authority recommend that it should be suggested to the Electricity Commissioners that an inquiry should be held into the whole question of electricity charges in London and the Home Counties electricity district.

NORTHERN STAR LODGE, No. 3053.

Installation Meeting.

The Installation Meeting of the Northern Star Lodge, No. 3053, was held at the Midland Hotel, Manchester, on Friday last, and was well attended by members and visiting brethren.

The reigning Master, W.Bro. Samuel Shadbolt, opened the Lodge, and in due form installed his successor, W.Bro. C. Ernest Teasdale. The newly-installed Master subsequently appointed and invested his officers, and presented a Past-Master's jewel to W.Bro. Samuel Shadbolt, in recognition of his services during his year of office.

The following is a complete list of the officers for 1928-9:

W.M.	W.Bro. C. Ernest Teasdale
I.P.M.	W.Bro. Samuel Shadbolt
S.W.	Bro. Alexander Mackay
J.W.	W.Bro. W. J. Smith
Chaplain	W.Bro. L. B. Taylor, P.Pr.G.D. (Staffs.)
Treasurer	W.Bro. T. W. Jordan, P.Pr.G.D.
Secretary	W.Bro. Maurice L. Williams
D.C.	W.Bro. James Bridge
S.D.	W.Bro. R. B. Glover
J.D.	Bro. James Mitchell
A.D.C.	W.Bro. Harry Butterworth
Almoner	W.Bro. S. Meunier, P.Pr.G.D.
Organist	W.Bro. E. J. Wellens
I.G.	Bro. George P. Mitchell
Stewards	Bro. Joseph Hall, Bro. John T. Haynes, Bro. R. W. Broadhead, Bro. J. H. Clegg, Bro. D. Gibb, W.Bro. H. R. Crow, Bro. J. W. Sutton, Bro. W. M. Carr, Bro. P. Blair, Bro. T. W. Smith
Tyler	W.Bro. H. Firth (Manchester)

The W.M., W.Bro. C. Ernest Teasdale, presided at the banquet which followed.

PERSONAL.

An interesting ceremony took place at the Tay Works, Bonnington, Edinburgh, on Friday last, when Mr. WILLIAM WILSON received a photograph of himself, framed and suitably engraved, with a wallet of Treasury notes, from the Directors, staff, and employees of Messrs. Peebles & Co., Ltd., Gas Engineers, on his retirement after 57 years' exemplary service. Mr. Wilson was the last link of the old employees of the firm, which started in 1866 in Edinburgh. He joined when a boy in 1871.

ELECTRICITY SUPPLY MEMORANDA.

The South-Eastern Scheme.

THE Central Electricity Board have issued a memorandum announcing their adoption of the South-Eastern Scheme, with various modifications. The scheme is now fully legalized, subject to certain rights of appeal within a month. It will be remembered that the Electricity Commissioners published an outline of the project last autumn, and, as endorsed by the Central Board, it remains practically the same. The main difference is that there has been an increase in the number of power stations definitely selected for expansion. The original thirteen stations have been increased by the inclusion for immediate development of fifteen others. Another important change is that the much-discussed station at Chiswick will not be built, but, instead, the existing Fulham station will be enlarged. Two stations additional to those proposed by the Commissioners have been placed in the class of the selected—Maidstone and Bedford—making three with the Fulham station. On the other hand, the extensions which were projected at Brighton, Hackney, and Stepney have been abandoned. That will cause distress. It will be remembered that this extensive scheme covers an area of 8828 miles, and embraces the counties of London, Middlesex, Hertford, Essex, Kent, Surrey, Berks, Bucks, Bedford, Cambridge, Huntingdon, and parts of Sussex, Hants, and Suffolk. The number of public supply generating stations in the area to-day is 135; and with the changes that have been effected in the scheme, there will be 31 selected stations to be expanded into super-power stations, and gradually to supersede the remainder. Four new stations will be built—one at Battersea (London Power Company, Ltd.), one at Little Barford, near St. Neots, and two at other sites yet to be chosen. The capital expenditure on transmission and generating stations, it is computed, will amount to £12,000,000 by 1933-34. While it is not expected that the full scheme will be completed for five or six years, certain parts of the area, it is anticipated, will be receiving a supply under the scheme by the end of this year or the beginning of next. It is explained that the preference of the Board for the extension of the Fulham station to the erection of the proposed one at Chiswick was not in any degree influenced by the fear that a station there would destroy the amenities, but because it is possible to convey coal by water to Fulham with greater facility than to Chiswick.

The Grid.

The electric "grid" with its transforming and switching stations, high-pressure overhead lines, and underground mains will be a somewhat costly part of the project. From Peterborough in the North to Worthing, Brighton, Eastbourne, Hastings, and Folkestone in the South, from Aylesbury, Reading, and Basingstoke in the West to Ipswich, Colchester, Southend, and Ramsgate in the East, will be covered by principal and secondary transmission mains so arranged on a series of circular plans as to ensure, it is hoped, an unfailing supply of electricity. London will have the largest of these rings; and this, it is said, will allow of the breakdown of any one station to be remedied by the smooth working of the others. It is intimated that specifications for the erection of the transmission lines, and the extension of the power stations, will be issued shortly. Exactly what "shortly" means is not known; but in the case of the Scottish scheme, nine months separated its adoption and the beginning of the first constructional work. It is calculated that upon transmission the Central Board will spend £6,690,840, and that the cost to the owners of station extensions will be £5,654,000—a total of £12,344,940. The public are warned against expectations of any great or immediate reduction in the price of electricity for lighting purposes. The first price reduction, when it can be made, will be for current for power; but hope is held out that, as the scheme develops, electricity for all purposes will become not only more plentiful, but considerably cheaper.

Private Generating Plant.

A reflection of the views of large industrialists regarding the future of electricity supply in this country under the Government generation and transmission scheme is supplied by the fact that Imperial Chemicals, Ltd., through Synthetic Ammonia and Nitrates, Ltd., are spending money freely on an extensive generating plant. This is an assurance that they believe in the economy of a private plant; and certainly they can ensure better control of supply and constancy than by relying on an outside service. The Company have recently entered into a contract to an amount exceeding £800,000 for an extension of the pulverized fuel plant at the electricity works of Synthetic Ammonia and Nitrates, Ltd., on the north bank of the Tees at Billingham. It is said that this will rank as the largest electricity generating plant owned by any individual industrial firm in Great Britain.

Water-Heaters and Frost.

"Hotspot," the writer of "Cooking and Heating Notes" in "The Electrical Times," has been dealing with the behaviour of electric hot water apparatus under the severe temperature conditions which prevailed about Christmas time. His inquiries, so he says, were suggested to him by the "exceptionally" (*sic*) amount of trouble and inconvenience caused by frozen-up coal fire installations and gas geysers. He asserts that this was a common topic of conversation in the train and round the luncheon table. So far as gas geysers are concerned, we are doubtful whether "Hotspot" really understood the conversations which he heard in trains and round the luncheon table, seeing that, with our large experience of these popular instruments, we have not heard of a single instance of one having given any trouble during the frosty weather. In fact, the gas geyser which we have in use daily has not misbehaved itself in this manner ever since its installation some years ago. "Hotspot" says that his own electric hot water installation continued throughout the trying period to function without any sign of trouble. We congratulate him. We also compliment him upon the excellent behaviour of his "cold" water supply, which, he says, tested first thing in the morning, after the most severe night frosts, registered only 2° Fahr. below the average summer temperature of 48° Fahr. He explains how this happened; it simply amounts to the piping being protected by its situation. His experience, however, seems to be exceptional, for he admits that electric hot-water storage installations in general appear, from the reports of supply authorities who have large numbers on circuit, to be not necessarily more immune from the effects of frost (as regards failure of domestic hot water supply) than other systems. We are at a loss to see how they could be, although "Hotspot," in his desire to make a point, says that all the troubles that have been experienced are entirely external to the electrical apparatus itself; this being practically safe from freezing-up troubles. He makes the sapient remark that this is really an advantage compared with the saddle-back boiler and gas geyser, either of which may freeze-up internally, in which case the damage done may be extensive and costly. It would be of interest if "Hotspot" would explain how this comes about, so far as a gas geyser is concerned, seeing that in the modern geyser the gas has to be extinguished before the water supply is shut-off, and these operations take place prior to either gas or water entering the geyser. Thus the geyser simply drains itself dry. It is curious what a lot of faults gas apparatus seems to be subject to in the electrical mind and nowhere else, owing to the craze for disparaging everything in which gas is used as the heating agent. But stay! apparently we do not know so much about gas geysers as electrical "Hotspot." We learn that they are not particularly fool-proof at any time, and may become acutely dangerous when the water-supply pipe is freezing. When this happens, the information is given: "The water ceases to flow as soon as the pipe empties, and then after a short interval the bottom of the apparatus probably falls out." What it all means we have not the slightest notion. But what may be even more disastrous is, we learn, that the partly frozen pipe may suddenly re-establish the flow of water at the critical moment when everything is thoroughly hot and the joints are about to give out. Why everything should be thoroughly hot when there is no water flowing is difficult to see. Compare with this the electrical thermal storage water-heater which, even if deprived of its water supply, can generally, we are told, be trusted to run quite safely through frosts and exceptional circumstances. The electrical humorist winds up his strange comparison of gas and electric geysers by stating that, even if the thermostat misbehaves itself, more lengthy warning of impending trouble would usually be given with the electric geyser than is provided by the hurried departure of the gas geyser through the bathroom window. Will "Hotspot" believe us when we tell him that not a single case of any one of these happenings has come under our notice in connection with a modern geyser fitted as a geyser should be. It is the height of foolishness for electrical men to write of a competitor in terms of misrepresentation or of pure ignorance. Technical qualification ought to keep them clear of putting in print the falsities of prejudiced imagination.

Bitumen Explosions.

Mr. A. B. C. Licence, Chief of the Research Department of Messrs. Berry, Wiggins, & Co., Ltd., has written to the "Electrical Times" on the reference, in the report of the Electricity Commissioners on the Acton explosion, to the presence in the vicinity of sooty deposit. The reader of the report is left to the conclusion that the deposit was actually soot, with a tacit implication that it originated in the incomplete combustion of so-called "bitumen gas." Similar sooty deposit was observed following the explosion near the Royal Institution on Dec. 29. Mr. Licence says that he is able to state on unimpeachable authority that

a sample of this sooty deposit proved on chemical analysis to contain over 50 p.ct. of oxide of lead, upwards of 20 p.ct. of oxide of copper, about 15 p.ct. of the usual silicates, &c., which might be expected; the remainder being mainly organic matter. This composition gives rise to the suggestion that closer methods of investigation are necessary before the causes and mechanism of the so-called bitumen gas explosions can be successfully unravelled.

A Crop of Bad Failures.

Manchester experienced a big shock through a failure of electricity supply on Tuesday evening last week. It affected an area in which are two theatres, the Midland Hotel, and a café. The failure occurred just after seven o'clock, and is said to have been due to a fault between the Midland Hotel and the Hippodrome. Dances and dinners were in progress at the Midland Hotel, which has no secondary system of lighting. At the Princes Theatre, Miss Gladys Cooper was appearing in "The Letter;" and candles had to do duty for the usual footlights. At the Hippodrome, two gas-lamps were hurriedly connected up, and placed at either side of the stage. The Oxford Street Picture House also suffered. The Central Station was in the affected area, and hand lamps were used for platform lighting. On a Saturday evening in January, Norwich experienced a failure in its central part—the collapse lasting about half an hour. Shortly before half-past five a vivid flash of lightning was followed by a crash of thunder. In the neighbourhood of North Walsham the lightning struck the overhead high-tension line, carrying the electric current from Norwich, and then burnt out the transformer at the end of the line. This, the report says, set up a "surge" on the underground high-tension main, which caused a fault at the sub-station in King Street. One of the machines at the Duke Street converting station was also put out of action, while two others, as a result, became so overloaded that they broke down under the strain, and the supply from the station failed. Shops were at the time thronged with customers; and candles and other forms of lighting had to be quickly brought into service. In the Market Place, darkness disturbed business; but a short distance away, enjoying legitimate triumph (to use the words of the local paper), was the welcome and cheerful illumination from the central premises of the British Gas Light Company. At the Post Office and in the big business establishments, candles had to be requisitioned. Subsequently, other sub-stations were affected; and so some parts of the city had their electric light cut-off at a later period than others. Costessey and Drayton were both in the dark for a time, as also were Wymondham and Wroxham. At North Walsham the light was not restored until Sunday. The Manager of the London Street branch of the International Stores states that in just over half an hour about 300 lbs. of candles were sold; and as there is an average of 12 to the pound, the total was about 3600. That is the sale from only one shop. Last Friday week, the electric light of Stoke-on-Trent, including the six Potteries towns and part of Newcastle-under-Lyme, failed through a breakdown at the central electricity works at Hanley. The accident occurred during the busiest shopping hour between 7 and 8 o'clock. The performances at the theatres and picture houses were delayed. Middlesbrough last Saturday week also experienced a failure during the evening; and consumers who rely upon this inconstant form of lighting found themselves in darkness for upwards of 2½ hours. The shops which sold candles were literally besieged by hundreds of worried shopkeepers, whose Saturday night trade was seriously affected. No less than 200 candles were used at the Grand Opera House; and the same primitive means of lighting was seen at the Theatre Royal. There was a failure at the east-end of Sheerness last Saturday, when evening shopping was at its height. The tradespeople who rely upon electricity for illumination were very unhappy. The "Dundee Advertiser" reports that, as a result of an electrical fusion, damage was occasioned by a fire at 16, Panmure Terrace, Barnhill. The occupants discovered a drying room and bedroom on fire, and did their best to keep down the outbreak until the arrival of the Fire Brigade.

FORTHCOMING ENGAGEMENTS.

[Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.]

March 2.—"B.C.G.A." INDUSTRIAL SALESMEN'S CIRCLE.—Meeting in Birmingham. Address by Dr. C. M. Walter, and visits to the Heat-Treatment Shops at the Windsor Street Gas-Works, and to the British Industries Fair.

March 2.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Annual general meeting in Manchester. Visit to the Victory Works of Messrs. Parkinson & Cowan (Gas Meters), Ltd.

March 3.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Stourbridge Gas-Works.

March 3.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting. Paper by Mr. W. M. Paterson, of Bath, on "Distribution."

March 10.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Meeting in the Royal Technical College, Glasgow. Paper by Mr. A. McDonald, of Motherwell, on "The Unification of Gas Undertakings."

March 10.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Visit to the Chain Works, Pontypridd. Paper by Mr. J. Hislop on "District Complaints."

March 13.—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Committee.

March 13.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

March 15.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in Birmingham. Paper by Mr. S. J. D. Williams, of Stourbridge, on "Condensation."

March 17.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Leeds. Paper by Mr. J. W. Holroyd on "Mains and Services."

March 17.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to the Cupar Gas-Works.

March 21.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30.

March 21.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Works of Messrs. W. C. Holmes & Co., Ltd., Huddersfield.

March 24.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Kilmarnock Gas-Works.

March 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual general meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

March 30.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting in the Westminster Technical Institute. Paper by Mr. F. C. Smith, of the Gas Light and Coke Company.

April 13.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the South Western District at Ilfracombe.

April 24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Meeting at Tunbridge Wells.

May 3.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General meeting at Tredegar (Mon.).

May 9.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Midlands District at Redditch.

May 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual general meeting at Hotel Cecil, W.C. 1, under the presidency of His Grace the Duke of Sutherland.

May 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the works of the Rochester, Chatham, and Gillingham Gas Company.

May 24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Cornish District at Truro.

INSTITUTION OF GAS ENGINEERS.

March 12.—Special Council Meeting for consideration of Royal Charter.

March 12.—Emergency Committee and Finance Committee.

March 12.—Effluents Research Chemists' latest report for presentation to Emergency Committee.

March 12.—Benevolent Fund Committee of Management.

March 13.—Executive Committee of Gas Education Committee.

March 13.—Wrought-Iron Tubing Research Committee.

April 2.—Special General Meeting of the Institution for submission of Terms of Royal Charter.

April 3.—Gas Education Committee.

May 1.—Refractory Materials Joint Committee.

May 8.—Executive Committee of Gas Education Committee.

June 12-15.—Annual General Meeting at Cardiff.

July 10.—Gas Education Committee.

Oct. 9.—Gas Education Committee.

Nov. 13.—Executive Committee of Gas Education Committee.

Dec. 11.—Executive Committee of Gas Education Committee.

CARBONIZATION CONFERENCE.

BIRMINGHAM, FEB. 21 to 24.

The Carbonization Conference organized by the Joint Fuel Committee, consisting of the Institution of Gas Engineers, the Coke Oven Managers' Association, the Society of Chemical Industry, and the Institute of Fuel, was opened at the Birmingham and Midland Institute, Birmingham, on Tuesday, Feb. 21.

Prof. ARTHUR SMITHELLS, F.R.S., Chairman of the Joint Fuel Committee, in asking Sir Richard Threlfall to open the Conference and give a welcome to Birmingham, said it was almost unnecessary at any such conference to introduce him, as he was so well known to all of them for the part he had taken, and continued to take, in dealing with fuel problems.

AN AUSPICIOUS WELCOME.

Sir RICHARD THRELFALL, F R.S., Chairman of the Fuel Research Board, said the great honour of welcoming the Conference to Birmingham had been conferred upon him mainly on the grounds that he happened to be a citizen of Birmingham, for no other person would be entitled to welcome a conference to that great city. In this Conference was to be recognized the fact that the study of fuel had at last come into its own. He was aware that there had been previous conferences—in fact, three previous ones—and he hoped there would be many more. Thirty years ago, when he first became interested in fuel, he could not find anybody to talk to about it. Nobody took any interest in it, and people said that all they wanted to know was that the price of fuel was so and so. It was, indeed, only in the last few years that he had found people who would take an interest in the scientific aspect of the subject. During the present conference he understood that low-temperature carbonization was to be discussed. That was a question which first reached a practical experimental stage in the neighbourhood of Birmingham. He believed it was in 1909 or 1910, when he was still acting as Consulting Engineer, that he had the opportunity of spending a month in the works of the late Thomas Parker investigating the problem; and he had always felt—as he had stated on many occasions—that if that attempt had only been carried out in a gas-works, there would have been a reasonable chance of its succeeding. After all, however, the whole problem of the carbonization of coal at low temperature was only a problem, so to speak, of intermediate interest; for in the future he supposed gas would be used, and eventually we should come to gas and electricity, and anything in-between would assist the intermediate stage by removing the reproach of befouling the atmosphere with smoke. Outside the meeting hall was the statue of James Watt, who was known to everybody as the improver of the steam engine; but it was not generally known what a versatile person James Watt was. It was a fact that he had studied the problem of avoiding smoke in connection with his engines; and there were some interesting references in this connection in the collection of his letters made in 1844 by Mr. Muirhead. There was a splendid collection of Watt relics to be seen in the Birmingham Public Library. Continuing, Sir Richard said he need not refer to Murdoch's work on gas, which was well known to everybody. He would just mention that gas was first employed in lighting the Soho Works, according to Watt, in 1802, a matter of 125 years ago; and he personally, speaking to a number of those interested in the carbonization of coal, was amazed to think that the subject still required extended experimental research after a quarter-of-a-century. However, perfection could never be reached in this or in any other matter.

Prof. SMITHELLS said he was sure it would be the wish of the Conference to thank Sir Richard Threlfall for the welcome he had given to the Conference and for his interesting observations. He acknowledged, on behalf of the Conference, the presence of Ald. J. H. Lloyd, Chairman of the Gas Committee in Birmingham, and Mr. A. W. Smith, who were associated with the welcome. All felt that there was no city in the country in which a conference on carbonization could be more fittingly held, and Sir Richard had indicated that. Not only was Birmingham at the moment accentuated in importance by the holding of the British Industries Fair, but in itself it would always stand as one of the chief centres in which the carbonization of coal had been furthered, and where a public authority had shown splendid enterprise, and where there existed examples of carbonization that could not be surpassed in any part of the country. He could speak feelingly on this subject because he had been concerned personally, as Chairman of the Research Committee of the Institution of Gas Engineers, and in connection also with Leeds University, for which a great deal of experimental work was carried out in Birmingham. He could not speak too highly or too gratefully of the way in which the authorities in Birmingham and their officers had lent themselves and their resources to this investigation work.

THE CHAIRMAN OF THE FUEL RESEARCH BOARD.

Sir Richard Threlfall was not only a distinguished citizen of Birmingham, but also Chairman of the Fuel Research Board. Sir Richard had alluded to the work which he did 30 years ago. That work began in Australia and became well known in this country. Prof. Smithells referred specially to the work which Sir Richard Threlfall did as Chairman of a Royal Commission which had to consider the loading and carrying of coal at sea; and he personally remembered very well the paper which was written by him and appeared in the Journal of the Society of Chemical Industry—a model paper on applied science and one which he himself used to bring before his students every year as illustrating the right kind of treatment of a great practical topic. The coal industry was still to some extent at sea [laughter]; and it was very fortunate for them that the services of Sir Richard Threlfall, as Chairman of the Fuel Research Board, were available, and that he would be one of the guides of the carbonization industry. They would look to him with confidence for an appreciation of both the scientific and the practical sides of the problems which had to be investigated. Sir Richard had expressed some surprise that there should still be so much scope for research, but there would always be scope for research on carbonization and other fuel problems. There was also scope for conference, and for the application of the knowledge which had already been collected to the problems that confronted them.

FUEL PUBLICITY AND THE PUBLIC.

He did not wish to justify the holding of this Conference. These conferences had come into being during the last four years. At first they were held by one agency, but others had lately come together, and there were now four distinct bodies uniting. It was believed by those concerned that by the interchange of information, by the pooling of knowledge, there would be mutual help, and by that means it would be possible to solve the many problems that abounded in the coal industry. He hoped, also, that it would be possible to do one thing further—namely, afford some guidance to the public as to how far problems had been solved. He felt at the present time that it was a real cause for anxiety and alarm that the public should be so much at the mercy of those who made explicit and definite statements with great confidence and with great publicity on some of the most difficult questions connected with fuel. From a conference such as this, the public, through the Press, ought to get some clear idea as to how far problems had been solved, and should receive some warning against putting their belief and their money into enterprises concerning which over-confident statements were made and claims put forward which, in the present stage, could not be fully justified.

Finally, Prof. Smithells congratulated the organizers of the conference on the arrangements, and specially referred to Dr. E. W. Smith, the Hon. Secretary of the Joint Fuel Committee.

In mentioning the receipt of a telegram from the President of the Society of Chemical Industry regretting his inability to come to the Conference, but wishing it all success, Prof. Smithells said he had received some 400 letters of regret at inability to attend, but in spite of this there had been acceptances from several hundred interested people.

In asking Dr. G. C. Clayton, M.P. (Society of Chemical Industry), to take the Chair for the morning session, Prof. Smithells expressed the appreciation of the Conference that Dr. Clayton, despite his pressing industrial and Parliamentary engagements, had found it possible to come.

[By official request, our report of the discussions has been submitted to the Hon. Secretary of the Joint Fuel Committee and to the various speakers. It is intended to publish the first instalment as a Supplement to our issue of March 7.—Ed. "G.J."]

LUNCHEON AT THE BRITISH INDUSTRIES FAIR.

On Wednesday, Feb. 22, those attending the Carbonization Conference were entertained at luncheon in the British Industries Fair, Castle Bromwich, by the Birmingham Chamber of Commerce and the Fair Management Committee. Col. H. J. WALDUCK (Chairman of the Fair Management Committee) presided; the luncheon being officially to representatives of the four Societies comprising the Joint Fuel Committee and the British Commercial Gas Association. There sat with him at the top table: Mr. G. N. Guest (President of the Birmingham

Chamber of Commerce), the Lord Mayor of Birmingham (Alderman A. H. James, C.B.E.), Sir Richard Threlfall, F.R.S., Prof. Arthur Smithells, F.R.S., Mr. J. E. Cowen, Dr. E. W. Smith, Alderman J. H. Lloyd, M.A. (Chairman of the Birmingham Gas Committee), Mr. Alfred Procter (President of the B.C.G.A.), Dr. D. G. Clayton, Mr. J. Terrace (Vice-President of the Institution of Gas Engineers), Mr. F. C. Briggs, Mrs. Cloudesley Brereton, Mr. A. W. Smith (General Manager and Secretary of the Birmingham Gas Department), Mr. F. W. Goodenough, C.B.E., Mr. R. B. Hodgson (Chairman of Council of the Society of British Gas Industries), Dr. Freeth, Mr. Hebden, and Mr. Davison. After the toast of "The King" had duly been honoured,

PERENNIAL YOUTH OF THE GAS INDUSTRY.

The CHAIRMAN proposed "The Visitors," and offered a welcome to the Fair to all present. As gas was, after all, the most important product of coal carbonization, he felt it only right that he should refer first specifically to the gas industry; and this was all the more appropriate as this year, for the first time, there was a special Gas Industries Section at the Fair. The gas industry had a very long history; but the surprising thing about it was that it seemed to enjoy perennial youth—if we could take it that the characteristic of youth was a determination to keep abreast of all developments and alive to the ever-changing spirit of the age. No better example of this could be cited than the attitude of the gas industry towards co-partnership. In his opinion, co-partnership was the bright spot in the development of industrial relationship to-day. The gas industry was among the first to give effect to this principle; and co-partnership had, in the gas industry, attained a development and a degree of general adoption more extensive than in any other great single industry in the country. He felt he was right in calling the gas industry a great industry, bearing in mind some of the figures displayed on the excellent banners to be seen floating over the Gas Industries Section. It was to be noted that £160,000,000 was invested in the gas industry, which gave employment to over 100,000 men, and supplied heat or light to over 90 p.ct. of the population. He had been interested to note some remarks made by Sir David Milne-Watson recently, as to the growth of the Gas Light and Coke Company. Sir David mentioned that during the past year there had been an increase in the demand for gas from his Company which increase alone amounted to as much as was required throughout the year for a town as large as Bath, Reading, or Southampton. These startling figures proved that the gas industry was not only alive, but very rapidly growing; and this experience was borne out by facts gleaned from the United States of America where (in spite of electricity being utilized on the average to a much greater extent than in Europe, owing largely to the cheap production which was rendered possible by the availability of water power) it was found that side by side with the development of the electrical industry there was a development of the gas industry equal to, if not greater than, that in this country.

CO-OPERATION OF THE MANUFACTURERS.

The spirit of co-operation and co-ordination which was so apparent in the gas industry itself was noticeable also in the manufacturing firms who supplied the appliances and plant. In this first Gas Industries Section of the Fair, sixty firms had co-operated and had spent money and energy in building-up the individual stands of which it was composed. He felt certain that the great success with which their efforts had been crowned would lead to the Section next year being double or treble what it was to-day; and so long as the cooking, lighting, and heating sections were included in the schedule of the Birmingham Section of the Fair, all manufacturers in the industry would make the Fair the one occasion in the year when they would display their most up-to-date plant and appliances, with the sure knowledge that at the Fair they would get the attendance of a greater number of buyers than was possible on any other one occasion during the whole year. There was no need to mention the great advantage which the industry secured by reason of the participation of the British Commercial Gas Association in this exhibit. Interested as the "B.C.G.A." was in publicity and advertising, there was no better opportunity for displaying the virility and the potentialities of the industry than by taking part in the Fair.

COAL CARBONIZATION.

The Joint Fuel Committee were holding an important conference in Birmingham this week on the subject of coal carbonization. The proper utilization of fuel was of primary importance to our national well-being; and carbonization was the most important means of bringing this about. The gas industry and the coke oven industry depended upon it. Approximately 38 million tons of coal were used in these industries annually; and about 20 p.ct. of the gas made in Great Britain was used for industrial purposes. The coke oven industry supplied the fuel for our steel industry, the future of which largely depended upon the capacity of the coke oven industry to produce a cheaper coke. The technique of carbonization had made rapid strides in the past twenty years; and the Birmingham Gas Department had been well in the van in this connection. A great deal could be done by closer co-operation and interchange of ideas; and he understood the chief object of the Joint Fuel Committee was to organize such conferences as the one now being held, with the view of making the best use of already existing information and technique, rather than the discussion of research. The British Industries Fair endeavoured to put before the general public the practical outcome of the development of technique in the form of plant and processes; and the deliberations at the Fuel Conference should have a material effect upon the exhibits of future years. Speaking as a manufacturer and user of gas, he hoped the result of these conferences would be to increase the efficiency of carbonization processes, so that in due time it would be possible to reduce the price of gas, and, in consequence, still further consolidate the position now occupied by the gas industry in providing smokeless fuel in such a convenient form for industry generally and for the home. With the toast, he coupled the names of Sir Richard Threlfall and Mr. J. E. Cowen.

THE FUEL RESEARCH BOARD.

Sir RICHARD THRELFALL, F.R.S. (Chairman of the Fuel Research Board), replying, said he had been a member of the Board since its inception in 1916; and the arrangement adopted at that time was a very good one. He had been one of those who had persuaded the late Sir George Beilby to take in hand this fuel work; and eventually Sir George consented, on the condition that he had a small Committee, whom he himself nominated. Sir Richard Redmayne was one member, Sir Charles Parsons was another, and he (Sir Richard Threlfall) was the third; the condition being imposed that they were to be at hand if wanted, but that they were not to speak if they were not spoken to. [Laughter.] As could well be imagined, very cordial relations were preserved under these conditions. The only time he felt at all strongly with regard to his allegiance was when he happened to be in the West of Ireland, and was summoned back by telegraph to decide a question which afterwards became of some interest to the public of the British Isles—viz., whether gas should be charged for by volume or by thermal value. Since then, he had preserved the same attitude towards the present Director of Fuel Research. When spoken to, he was very glad to assist; but he did not meddle with the matter otherwise. The Chairman had mentioned the question of relationship between different branches of the gas industry; and he hoped there would be included in this the electrical industry, because he felt the time was coming when these industries were beginning to show some signs of that convergence which he apprehended would be complete in about two or three generations. [Laughter.] He had seen the beginning of it when he was in Canada, the year before last. The Shawinigan Electric Company—which was a very large and prosperous affair, and had reached-out in all directions, and absorbed other undertakings—found itself in Quebec in the position that if it wanted the electricity supply it would also have to take over the gas supply; and this offered possibilities. For example, during high water in the river the Company found itself with more electricity than it knew what to do with; and what could be more simple than to send it down to Quebec, and there use it for replacing the blowing period of a water gas generator, which was actually done. Another development he noticed in America was an attempted solution of the problem of how to utilize the gas-works in summer by making ice.

THE "B.C.G.A."

Mr. J. E. COWEN (Past-President of the "B.C.G.A."), in the course of his reply, said it had been suggested to him that there might be some present who did not know what the "B.C.G.A." was. The Chairman's remarks rather indicated that he at least knew something of what the Association were trying to do, because the objects of the Association had been very clearly set out by him. Therefore he ventured to think that time would be better spent inspecting the gas exhibit than in listening to anything he might have to say in regard to the work of the "B.C.G.A." That exhibit would show at once the enormous number of uses for gas and the vast amount of apparatus that could be employed for the purpose. At the same time, he wished to take this opportunity of thanking the Society of British Gas Industries for the work they had done in connection with the Gas Exhibit. As the Chairman had mentioned, this was the first year in which there had been a joint exhibit. Hitherto, the gas exhibits had been individual ones. Therefore the thanks of the industry were due to the Society of British Gas Industries for the spirit of co-operation that had been shown in putting before the public an example of what the gas industry as a whole really could do—thus backing-up the work being done on the prducing side. In this connection, a special word of thanks was due to Mr. R. J. Rogers, of the Birmingham Gas Department, who had acted as Secretary to the Gas Section, and had done an enormous amount of work in connection with it. Mr. Rogers had been engaged in this work for several years now; and his efforts seemed to increase every year. For that reason, the thanks of both branches of the industry were due to him for what he had done. It might be thought that such a Fair as this, which was, perhaps, primarily designed for bringing the products of British industry more particularly before colonial and foreign buyers, was hardly a suitable occasion to bring forward a gas exhibit. It might be said that the manufacturers of gas making plant and gas using apparatus would have an opportunity of selling their goods if they exhibited individually; but that was really only a relatively small part of the whole idea underlying the gas exhibit, because, after all, the gas industry depended for its prosperity and progress on the whole of the industries of the country. If the industries of the country were lagging and in a bad way, as many of them had seemed to be during the past few years, this naturally affected the whole of the gas undertakings of the country; and therefore the more the gas industry could do to stimulate trade generally, the better it was for the gas industry. The Fair was doing marvellous work in stimulating trade, not only in this country, but with foreign countries, and particularly with our Colonies and Dominions. The best market in the world for British goods, and the one which possessed the greatest potentialities for expansion, was the market of our Colonies and Dominions overseas; and everything possible should be done to develop it. The fact that the two sections of the Fair in London and Birmingham were growing, was evidence that this idea was being fully carried out. The uses to which gas could be put in industry were as yet in their infancy. It had been said that gas was already used in 3000 different processes; but there were still immense possibilities, because of the convenience, the saving of space and of cost, and the improved methods of production rendered possible by the use of gas. A Fair such as this, which brought these processes more and more to the notice of the buyer, was the very class of exhibition and propaganda required, not only for the gas industry, but for all British industries.

INSTITUTION OF GAS ENGINEERS.

CARDIFF MEETING, JUNE 12 to 15, 1928.

28, Grosvenor Gardens,
Westminster, S.W. 1,
Feb. 24, 1928.

As already announced, the Institution's Annual Meeting of 1928 will be held at Cardiff (the port of the South Wales coalfields), from Tuesday, June 12, to the following Friday, under the presidency of Mr. H. D. MADDEN, M.Inst.C.E., Engineer and Manager to the Cardiff Gas Light and Coke Company. It will be held in the Cory Hall, Station Terrace, Queen Street. The President will take the chair each day at 10 a.m., and there will be afternoon sittings each day.

The members will be welcomed at the commencement of the proceedings by the Rt. Hon. the Lord Mayor, Alderman A. J. Howell, on behalf of the citizens This will be followed by the presentation of the "H. E. Jones London Medal," which has been awarded by the Council to Mr. Thos. Carmichael, M.I.Mech.E., for his paper read last year on "Modern Carbonizing Economics as Exemplified by Results and Working Costs at the Works of the Portsmouth Gas Company." The Institution's Education Diplomas in Gas Engineering and Gas Supply which may have been awarded at the examinations to be held this year, will also be presented. Mr. Madden will then deliver his Presidential Address. The annual report of the Council and audited accounts for the year ended Dec. 31, 1927, will be submitted.

The Council have accepted the following papers for reading and discussion. They are now being prepared for issue, by May 12, to those members and visitors desiring to contribute to the discussions. These gentlemen are asked to make early application for copies of the papers they desire.

PAPERS.

"Some Applications of Chemistry in Gas-Making," by Harold Hollings, M.Sc., Institution Gas Research Fellow, 1912-14; Chief Gas Chemist to the Gas Light and Coke Company.

"The New Morriston Works of the Swansea Gas Light Company," by William H. Johns, Engineer to the Swansea Gas Company; Past-President of the Wales and Monmouthshire District Institution of Gas Engineers.

"Gas Supply East of Suez," by Stanley B. Johnson, Engineer of the Colombo Gas Company, who will deliver his paper in person.

"Economic Aspects of High-Pressure Distribution," by Stephen Lacey, B.Sc., Assistant Controller of Gas Sales, Gas Light and Coke Company; Institution Examiner in Gas Supply.

"Distribution at Tottenham. A Description of Some Recent Alterations and Extensions," by Harold C. Smith, M.Inst.C.E., Member of Council of the Institution; Hon. Secretary of the Southern Association of Gas Engineers and Managers.

The papers will be read in abstract only, in order that as much time as possible may be made available for discussion.

REPORTS AND OTHER TECHNICAL COMMUNICATIONS.

Reports of the following Committees, &c., will be presented and discussed:

Carbonization Conference at Birmingham (John Terrace, M.Inst.C.E., Vice-President).

Coal Analysis and Sampling Committee of the British Engineering and Standards Association (W. J. Smith, B.Sc., Delegate of the Institution, Member of Council).

Corbet Woodall Scholarship at the Leeds University (John W. Cobb, B.Sc., Livesey Professor).

Cast-Iron Pipe Flanges Committee of the British Engineering Standards Association (Thomas Hardie, M.Inst.C.E., Past-President of the Institution and Past-President of the Southern Association of Gas Engineers and Managers).

Joint Committee of the Institution and the Society of British Gas Industries (Thomas Hardie, M.Inst.C.E.).

Education Committee (F. W. Goodenough, C.B.E., Chairman, Controller of Gas Sales of the Gas Light and Coke Company).

Research Fellowship of the Institution at the Leeds University (John W. Cobb, B.Sc., Livesey Professor, and F. J. Dent, B.Sc., Gas Research Fellow).

French Association of Gas Engineers' Congress at Lille (John Terrace, M.Inst.C.E., Delegate of the Institution, Vice-President).

Gasholder Construction and Deterioration Committee (Charles S. Shapley, Vice-President, Past-President of the Manchester District Institution of Gas Engineers).

Gas Investigation Committee. (*a*) Nineteenth Report on "Products of Combustion of Typical Gas Appliances, with special reference to Carbon Monoxide" (James W. Wood, M.Sc., Research Chemist). (*b*) Twentieth Report, "Studies in Carbonization. Part III. Influence of Temperature of Carbonization. Size of Coal and Admixture of Sizes and Addition of Coke Breeze and Inorganic Compounds" (Albert Parker, D.Sc., Research Chemist).

Illumination. International Commission at Bellagio, 1927 (Robert Watson, Delegate of the Institution).

Association of Public Lighting Engineers. Congress at Brighton (the President of the Institution, Delegate).

Livesey Professorship at Leeds University (John W. Cobb, B.Sc., Livesey Professor).

Public Works, Roads, and Transport Congress, 1927 (the President, Delegate of the Institution).

Refractory Materials Joint Committee with the Society of British Gas Industries (John P. Leather, M.Inst.C.E., Chairman).

Royal Sanitary Institute Congress, Hastings, 1927 (Charles F. Botley, M.Inst.C.E.).

Shipping Engineering and Machinery Exhibition, 1927 (the President, Delegate of the Institution).

Smoke Abatement (W. E. Price, Assoc.M.Inst.C.E., Hon. Secretary of the Institution).

The Employment of Gas for Therapeutical Purposes Committee (E. W. Smith, D.Sc., Chairman; Treasurer of the Society of British Gas Industries and of the Society of Chemical Industry).

World Power Conference (Thomas Hardie, M.Inst.C.E., Delegate of the Institution, Past-President).

Wrought-Iron Tubing Research Committee (Albert Stokes, Chairman; Co-Manager of the South Metropolitan Gas Company).

The papers, reports, and other communications are now being prepared for presenting with a view to their issue as soon as possible to members applying to the Secretary for them. They will not be read *in extenso*. The Council have made this arrangement with the authors and reporters, with the object of leaving as much time as possible for the discussions.

BENEVOLENT FUND.

On Wednesday morning, at 10 a.m., the annual general meeting of subscribers and donors to the Benevolent Fund will be held, at which the report of the Committee of Management for the year 1927-28, and the audited accounts for the year ended Dec. 31, 1927, will be presented.

I am desired by the Committee to call the special attention of those hon. members, members, associate members, associates, and students, whose names do not yet appear on the list of regular subscribers, and to ask them kindly to consider this Fund, by means of which the Committee, on behalf of the contributors, are able to dispense help to those now or formerly connected with the Institution, whom misfortune has overtaken. Subscriptions from five shillings in amount will be most gratefully received, and donations of any magnitude are, of course, always welcomed for purposes of investment. At the present moment there are twelve names of widows, orphans, and members on the list of those receiving assistance. The extent of the succour which the Committee are able to render (often inadequate having regard to the circumstances of some of the cases) obviously is dependent on the measure of support which is received from the membership of the Institution. If the resources of the Fund could be augmented, the Committee would be in a position to increase the grants of some of those to whom it would be a great boon.

RECEPTION AND DANCE, &C.

On Wednesday evening a reception and dance will be given at the City Hall, by the kind invitation of the Lord Mayor and Lady Mayoress. The reception will be held from 8 to 9 p.m.

The President and Council of the South Wales Institute of Engineers have kindly invited our members and the ladies who accompany them to make use of the Institute during the week of our meeting. The building is situated in Park Place, close to Cory Hall, where our meeting is being held.

A Reception Committee, consisting of the Council of the Wales and Monmouthshire District Institution of Gas Engineers, with Mr. Octavius Thomas as Hon. Secretary, has been formed, and their services will be available during the whole week for giving the members and visitors particulars of local interest, and any other information within their power.

The Railway Companies of Great Britain have again courteously granted to members and visitors travelling to Cardiff the privilege of return tickets at the rate of single fare and a third. These will be available from June 7 to 19, and will be obtainable by the presentation at the booking office at the time of booking of a voucher signed personally by me as Secretary, as in previous years. These vouchers will be issued from the office of the Institution on May 25.

VISITS TO GAS WORKS AND SHOWROOMS.

Arrangements are being made to visit the Grangetown and Bute Terrace Works of the Cardiff Gas Light and Coke Company—and large steel works, docks, &c., in the vicinity—also for an excursion on the Friday. The Reception Committee of the Wales and Monmouthshire District Institution also have arrangements in hand for excursions and visits of interest, &c., for the ladies. Full details will be published at an early date.

Should any members or visitors desire to visit other works at Cardiff or in the neighbourhood in which they may be

specially interested, Mr. Octavius Thomas (Address: Gas and Water Works, Rhondda Urban District Council) will gladly endeavour to obtain cards of admission for them on receipt of a letter stating what their wishes may be in this matter.

HOTEL ACCOMMODATION.

It is of the utmost importance that reservations of rooms be made without delay, especially having regard to the visit to Cardiff on Tuesday, June 12, of H.R.H. The Prince of Wales, K.G. (Honorary Life Member of the Institution), for the purpose of unveiling the Welsh National War Memorial.

The Council have decided upon the Park Hotel for use as the Headquarters of the Institution during the period of the meeting from Monday, June 11.

WALTER T. DUNN,
Secretary.

BRITISH INDUSTRIES FAIR, BIRMINGHAM.

NOTES FROM OUR CORRESPONDENTS.

The Heavy Section of the Fair was better attended during the first week than in any previous year. The bulk of the buyers were for the home trade; and generally speaking stand holders reported that the amount of business done, and the number of trade inquiries received, were substantially in advance of 1927. According to the Fair authorities, the home buyers showed an increase of nearly 40 p.ct., and export buyers rather more than 25 p.ct.; but they point out that it is during the second week that the bulk of the overseas buyers attend. On Monday, Feb. 20, nearly 50 Members of Parliament visited the Fair, as well as a large party of British bankers.

There has already been received a large number of applications for spaces for stands next year. The Fair Management Committee propose to enlarge the site by another 15 acres; and further extensions to the exhibition buildings will probably be made in readiness for the Fair of 1929.

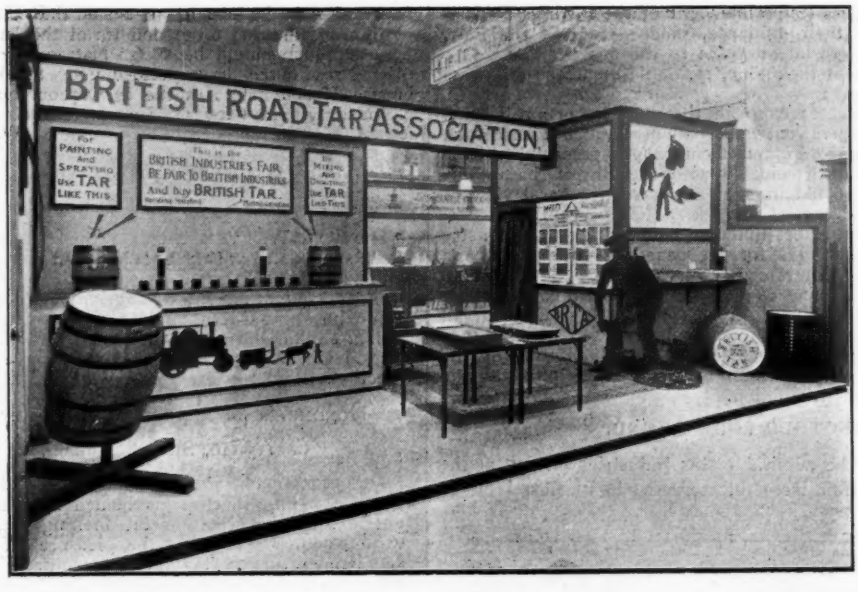
VISIT OF THEIR MAJESTIES THE KING AND QUEEN.

On Thursday, the Fair was visited by Their Majesties the King and Queen, who passed twice through the Gas Industries Section, and evinced great interest in the various exhibits, stopping at several stands.

During the tour, they were attracted by the stand of Electrolux, Ltd., on which are displayed three gas operated refrigerators, all of different models. One of these has the new display "surround" specially designed for gas companies who are keen to take advantage of the refrigerator market during 1928. The display is called "The Flame that Freezes." Both the King and the Queen showed much interest in the refrigerators; and a very pleasing little ceremony was witnessed when the Queen approached a young lady on the stand who represented "Jill Frost," which appropriate young lady is distinctly connected nowadays with "Electrolux" refrigerators. Miss "Jill Frost" was spoken to by the Queen about the refrigerators; and then she presented Her Majesty with a beautiful bouquet, which was accepted with the Queen's usual charm. The visit to this stand certainly attracted much notice; and very considerable interest has been shown throughout the Fair in the gas operated refrigerators. This interest will undoubtedly be reflected in the sale of the product through the various gas companies of the country.

Their Majesties also visited the British Road Tar Association stand. The Queen evinced a keen interest in a road section taken from the Roman Watling Street, which is of second century work. In contrast to this, the Queen was shown an example of twentieth century work, in the shape of a section taken from a tar macadam road, and constructed of all-British material. The rotating tar barrel, which is a feature of this stand, also called forth many favourable comments from the party who accompanied Their Majesties. The Association have reason to be gratified with the success that has attended their

THE KING AND QUEEN IN THE GAS SECTION INSPECTING THE GAS-OPERATED REFRIGERATORS.
"Jill Frost," in the costume made familiar by the "Electrolux" Advertisements, offers a bouquet to Her Majesty the Queen.


BRITISH ROAD TAR ASSOCIATION
FOR PAINTING AND SPRAYING USE TAR LIKE THIS
BRITISH INDUSTRIES FAIR
BE FAIR TO BRITISH INDUSTRIES
AND BUY BRITISH TAR

efforts in connection with both Fairs, which have been attended by many persons interested in road construction, both from home and abroad.

The exhibits of the National Gas Engine Company, Ltd., were also inspected; and here the King was interested in the 6 KW. lighting set which was generating current for the illumination of the stand. The operation of this was explained to him by the President of the Chamber of Commerce (Mr. G. N. Guest). Passing on, His Majesty had a conversation with a mechanic in overalls. He mentioned that years ago engines of this type always had a "very heavy bump," and remarked on the silence of the 110 B.H.P. "National" engine, which attracted his notice. The attention of His Majesty was called by the mechanic to the "National Daily Bulletin," an illuminated sign, changed from day to day, to greet the distinguished visitors to the Fair; the sign for this day being, of course, "A 'National' Welcome to T.M. the King and Queen," at which he laughed heartily.

Their Majesties were attracted by the magnificent display of the all-enamelled "Suburbia" gas cookers in various shades, exhibited on the stand of the Parkinson Stove Company, Ltd. Mr. D. MacCallum Gibb (Director and General Manager of the Company), who was in attendance, was called forward to explain the exhibits; and the King, noticing a "Suburbia" cooker finished in a blue-grey shade, remarked that it was a very beautiful production. His Majesty called the Queen's attention to the stove. Her Majesty, referring to another "Suburbia" cooker which was finished in white enamel, expressed a preference for the white stove. The King asked what were the special features in these cookers. Mr. Gibb explained that these were early samples of stoves finished by a comparatively new, wet, low-temperature enamelling process—a process with which the firm had been experimenting for nearly two years, with a view to getting the best results with an absolutely leadless composition. His Majesty inquired if there was any special advantage in this new process. Mr. Gibb, removing a porcelain enamelled boiling burner from the hotplate of the cooker, struck the cornice about half-a-dozen sharp blows with the burner, after which the King rubbed his gloved hand over the still undamaged surface, and Mr. Gibb pointed out that with this process the enamel could not readily be chipped-off.

INSPECTION BY FRENCH GAS ENGINEERS.

On Wednesday a visit was paid to the Fair by members of the Institution of Gas Engineers, Coke Oven Managers' Association, Society of Chemical Industry, and Institute of Fuel (who were attending in Birmingham a Carbonization Conference), British Commercial Gas Association, and Midland Association of Gas Engineers and Managers; and these representatives, as well as a party of French gas engineers, were entertained at luncheon by the Fair Management Committee. Reports of the proceedings appear on other pages.

The French Gas Engineers arrived in Birmingham about 11 o'clock in the morning. They were received by Mr. A. W. Smith (General Manager of the Birmingham Gas Department)

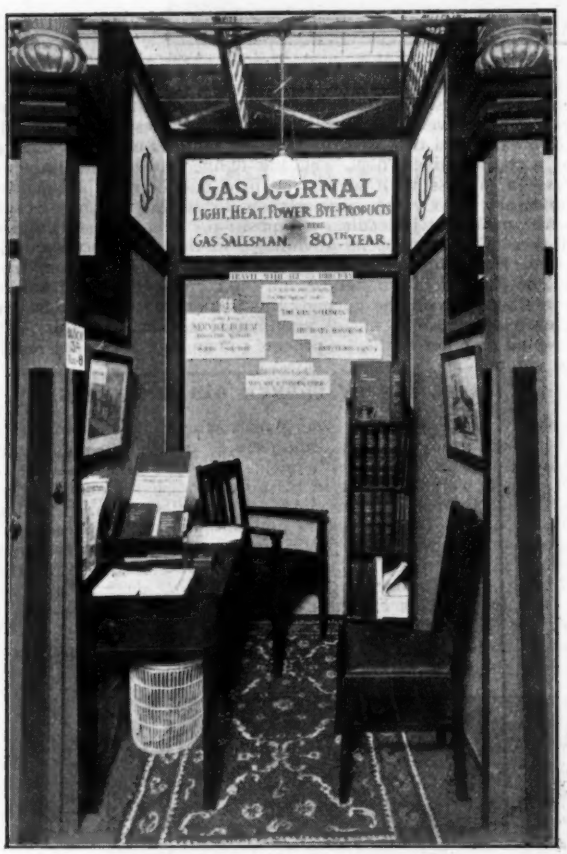
and Mr. R. J. Rogers (Superintendent of the Fittings Department); and, under their guidance, made a tour of the Fair, paying, of course, special attention to the gas exhibits.

At the conclusion of their tour, M. Sellié made the following interesting statement:

The French Delegates from all the most important French gas companies, on their visit to become acquainted with British methods of salesmanship and technical progress, chose the date of their arrival to coincide with the Birmingham Fair, knowing that they could in a glance have a general view of all the questions of special interest. They very much appreciated the important effort made by the British gas industry to develop the use of gas for the benefit of the public and for the general health and fuel economy. They admired specially the latest appliances made by the British constructors, very neat and fine looking in appearance, and seeming at all points perfect from the technical point of view. And they also have been much impressed by the importance of the British Industries Fair, which is a living example of the prosperity of the British nation.

ANOTHER LOOK ROUND.

The contents of the admirable Gas Industries Section at the Castle Bromwich Fair were fully covered in the last issue of



the "JOURNAL;" and a number of the exhibits in other parts of the huge buildings also received attention. Another look round, however, has revealed a few more displays which should be referred to in our pages.

HENRY BEAKBANE,

13, Maze Pond, London, S.E. 1.

Mr. Beakbane's "Fortox" Persian and chrome meter skins and discs are supplied in either the original Persian tannage, or re-chromed to specification. He produces other styles of leather, for specific uses; and samples of his goods can be inspected at the Fair.

CAMELON IRON COMPANY, LTD.,

Falkirk.

There are at this stand "Hestia" grates, with the new patent gas ring and fire lighter, for use with gas coke or other smokeless fuel. Without this accessory, the grates have been in use, burning ordinary household coal, for twenty years. The gas torch is made to suit supplies entering either from the right or the left hand side of the fire; and it can be removed altogether by hand, for cleaning, or to give a more symmetrical appearance to the hearth. It is said that within fifteen minutes of lighting the gas torch and turning it inwards beneath the fire, dry fuel should be sufficiently kindled to enable one to dispense with the gas lighter, which can then be extinguished or used for boiling a kettle of water, &c. These grates are provided with a blower which is hidden behind the canopy, and is at hand when required to kindle or revive the fire.

GRAHAMSTON IRON COMPANY, LTD.,

Falkirk.

The "Go-Well" is a gas heated portable boiler, with a sheet steel outer casing and a cast-iron pan; and it is fitted with a high-efficiency drip-proof coneless flame burner. Another type of boiler, also gas heated, is the "Efficient," which has a cast-iron outer casing and pan. It is provided with a similar burner to the "Go-Well," and has a gas connection which is moveable so as to receive a supply from any direction.

MONOMETER MANUFACTURING COMPANY (1918), LTD.,

115-116, Strand, London, W.C. 2.

The monometer standard "Simplex" hand-operated pressure die-casting machine is heated by gas at ordinary town pressure, and incorporates the melting pot, together with the arrangement for exerting the pressure on the molten metal. The temperature of the metal is controlled by means of the Monometer automatic heat controller. This instrument is of extreme importance in die-casting, as it enables regular results to be obtained, and prevents the metal from being overheated and burnt—which causes the tin and antimony of white metals to be burnt to dross, and the composition of the alloy to be altered. The melting pot and all working parts of the machine are made of special alloys, and with proper use will last for many years, but are easily replaceable when necessary. The firm also manufacture furnaces, all of which are designed for firing by town gas, producer gas, oil, electricity, or solid fuels.

MORRIS & WILKINSON, LTD.,

Beatall Works, Burnley.

There are over twenty patterns to select from of the firm's "Beatall" gas wash boiler. They are fitted with galvanized tops, copper tops, or aluminium tops; while the cases may be plain galvanized or blue or green enamelled. They are designed to meet the demand for any quality of boiler—either for housing schemes or general purposes.

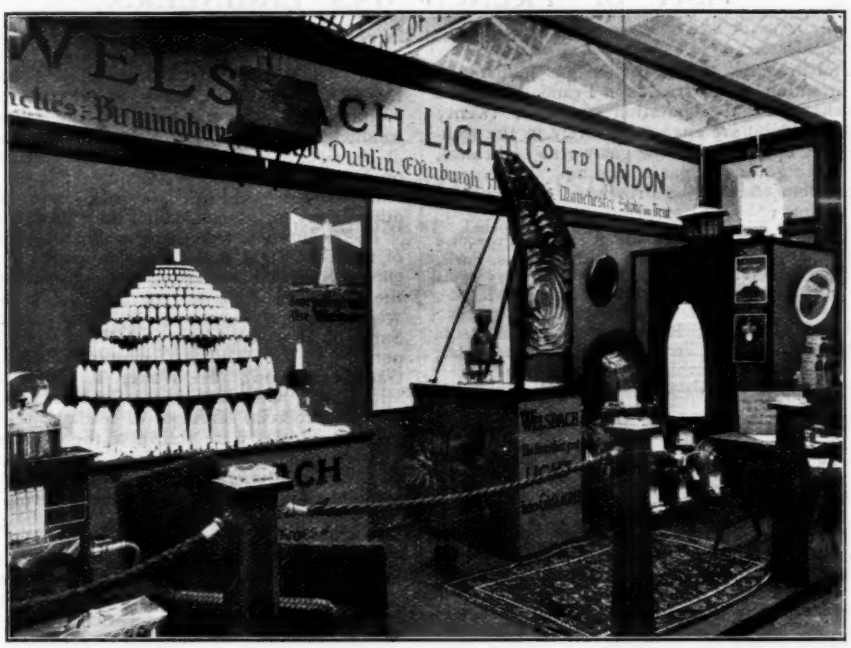
R. RUSSELL & SON, LTD.,

Peel Foundry, Derby.

The "Peveril" grate, which is to be had in many handsome designs, is now provided with two new patent devices. There is, in the first place, a coke valve (for burning 100 p.ct. coke) which occupies the place of the upper back brick in the standard "Peveril" grate, and makes it a simple matter to produce a bright glowing fire solely from coke, even when the draught in the chimney is normally poor. The chief aim of the coke valve is to direct the draught through the fire without obstructing the front of the grate. When coal, or fuel requiring only normal draught, is being used, the valve may be closed; and in this position it is quite inconspicuous. To obtain the best results, gas coke should be used, broken into pieces about the size of walnuts, and built up about 8 in. or 9 in. high, keeping the fuel well to the back of the grate.

The second device is an ingeniously arranged gas lighter for igniting ordinary gas coke without first making-up the fire by any other means. It is stated that a period of from four to five minutes is sufficient to start the fire so that it will burn without further attention. The action of the lighter is as follows: In front of the bottom grate, but sheltered from it, is a cylindrical burner the whole length of the fire. This burner is capable of being revolved, and is connected by a simple rod to a special gas tap at the side of the grate. On pulling over a lever, the gas is turned on and the burner automatically revolved; a series of holes being brought into position so that the flames therefrom impinge at an angle through the fire bars on to the fuel. When the fire is burning, the lever is closed. This shuts off the gas, and, at the same time, again revolves the burner, so that the holes are moved away from the bottom grate, and are thus entirely shielded from any dust or ash. The whole action is entirely automatic; and there is no possible chance of the burner holes being exposed after the gas is turned off. There are only three parts to the appliance—*i.e.*, the combined gas tap, operating lever, and rod and burner; and the last named may be removed from the stove by undoing one screw. The lighter may be used as a gas ring, or, by placing a number of asbestos lumps in the grate, instead of fuel, as a gas fire for occasional use in the summer months.

By means of these devices an intensely hot, clean, and smokeless fire is obtained from coke alone, with no more trouble than with a coal fire. The outward appearance of the new model "Peveril" is similar to the usual open-fire grate. It is very strongly and simply constructed; and there are no com-



plicated parts liable to burn away or get out of order. Coal alone may be used, if desired, in which case excellent results are said to be obtained from a very much cheaper grade than it is possible to use in the usual type of open fire.

The firm are also exhibiting an entirely new inset gas fire adaptable to the "Peveril" grates.

W. H. SUGDEN & CO., LTD.,

Glenny Road, Barking, London, E.

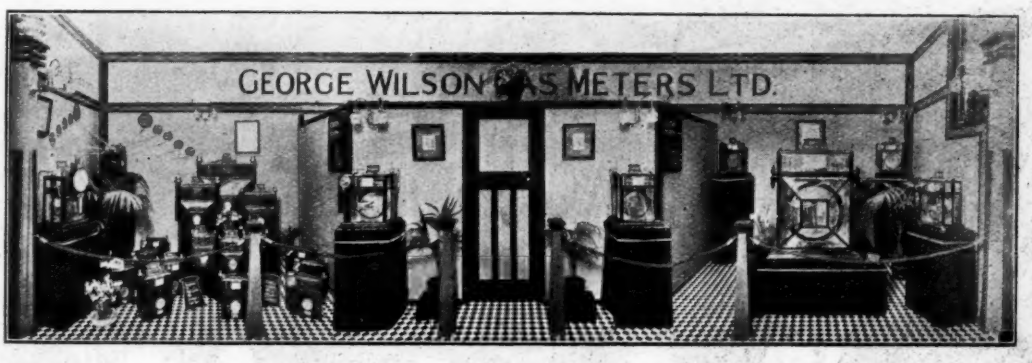
Another gas heated boiler to be seen at the Fair is the "Blick," which is designed for the dual operations of dish washing and clothes washing. For the former purpose a wire basket and propeller are brought into play, and for the latter a dolly.

ARDEN HILL & CO.

The address of Messrs. Arden Hill & Co. is Acme Works, Aston, Birmingham—not "Essex Works," as stated on p. 474 of last week's "JOURNAL."

A WARNING TO THE ELECTRICAL SECTION.

Speaking at the luncheon to the electrical trade experts at the Fair on Friday, Mr. G. N. Guest (President of the Birmingham Chamber of Commerce) warned the Electrical Section that there was a very fine Gas Section at the Fair, and "unless you buck-up," he added, "and make yours bigger, you will find the Gas Section growing bigger still." He added that the Fair at Birmingham would probably be larger next year.



Association of Public Lighting Engineers.

A conference of public bodies and officials interested in the above was held on Feb. 21 at the "E.L.M.A." Lighting Service Bureau Hall, Savoy Street, W. The chair was taken by Mr. Alex. C. Cramb, of Croydon. The conference received the support of the Ministry of Transport, who sent several representatives. There were about a hundred persons present, including representatives from the Municipal and County Engineers' Association, the Chief Constables' Association, the Surveyors' Institute, the County Surveyors' Association, the National "Safety First" Association, H.M. Ministry of Transport, the British Engineering Standards Association, the Illuminating Engineering Society, the Roads and Transport Congress, the Highways Association, also the Chairmen of the Watch and Lighting Committees of the various municipalities. A paper was read by Mr. W. J. Jones, M.A. After a discussion, it was resolved the British Engineering Standards Association confer with the various representatives above named, and form a Committee therefrom to deal with the subject.

Manchester District Institution of Gas Engineers.—The annual meeting will be held in Manchester on Friday next, March 2. A visit will be paid to the Victory Works, at Stretford, of Messrs. Parkinson & Cowan (Gas Meters), Ltd.; and afterwards the members will be entertained at lunch at the Midland Hotel. The business of the general meeting will follow, when Mr. R. H. Ginman, of Leek, the President-Elect, will give his Address.

Beckers Self-Sealing Coke Oven Door.—The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., and Messrs. Evence Coppée & Co., of Brussels, have the right to use Beckers' patents for their own installation in this country, so that these two firms do not come under the sole licence of the Transporting Machinery and Engineering Company, Ltd. As mentioned in last week's "JOURNAL," the door is not the "Becker," but the "Beckers."

The Bonsall Urban District Council have decided to enter into an arrangement with the Matlock Urban Council for the joint appointment of Mr. John White as Gas Examiner.

VISIT OF FRENCH GAS ENGINEERS.

[By Our Special Correspondent.]

That the work and progress of the British gas industry is receiving the close attention of our friends in France is evident from the circumstance that a deputation of about twenty representative gentlemen who are engaged actively in the technical and administrative operations of the gas-works of France, spent last week in visiting various gas-works and showrooms, not only in the Metropolis, but in the Provinces. The following is a list of the visitors:

M. SELLIE, Directeur Général de la Cie. Générale Française et Continentale d'Eclairage, 11, rue de la Tour des Dames, Paris.

M. SARRADE, Ingénieur-en-Chef des Services Extérieurs de la Société d'Eclairage, Chauffage et Force Motrice, 23, rue Balzac, Paris.

M. BAZILLE, Ingénieur-en-Chef, Régisseur des Usines de la Société d'Eclairage, Chauffage et Force Motrice, 23, rue Balzac, Paris.

M. NERRIERE, Directeur de l'Usine à Gas de Dieppe (Seine Inférieure).

M. MOUGIN, Secrétaire Générale de l'Union Syndicale de l'Industrie du Gaz en France, 12, rue de Clichy, Paris.

M. TIXIER, Secrétaire de la Commission de Vulgarisation de l'Union Syndicale de l'Industrie du Gaz en France.

M. SIMOR SAINT JUST, Ingénieur Chef de Service à la Société du Gaz de Paris, 6, rue Condorcet, Paris.

M. RECLUS, Ingénieur Chef du Service de l'Eclairage Public à la Société du Gaz de Paris, 6, rue Condorcet, Paris.

M. SERVILLE, Ingénieur-en-Chef adjoint du Service Commercial de la Société du Gaz de Paris, 6, rue Condorcet, Paris.

M. FERLET, Ingénieur à la Société d'Eclairage, Chauffage et Force Motrice, 23, rue Balzac, Paris.

M. BUREAUX, Ingénieur à la Société d'Eclairage, Chauffage et Force Motrice, 23, rue Balzac, Paris.

M. GROS, Ingénieur à la Société du Gaz de Lyon, 6, place Bellecour, Lyon.

M. BOUTEMY, Ingénieur à la Cie. Française d'Eclairage et de Chauffage par le Gaz, 58, rue du Rocher, Paris.

M. BING, Ingénieur Chef du Service Technique du Comité Central des Producteurs et Distillateurs de Goudron, 4, Rue Condorcet, Paris.

M. GROS, Ingénieur à l'Usine à Gaz de Nantes (Loire Inférieure) Compagnie Européenne du Gaz.

M. FREYNET, Ingénieur au Groupe Vautier, 3, rue de Liège, Paris.

M. VOYARD, Ingénieur a la Compagnie du Bourbonnais, 4, quai de la Pècherie, Lyon.

With M. Mougin, the indefatigable Secretary of the Union Syndicale de l'Industrie du Gaz en France, they arrived at the Belgravia Hotel, close to Victoria Station, on Sunday evening, Feb. 19, and early on the following morning were conducted to the Board Room of the National Gas Council at 28, Grosvenor Gardens, close by. Here they were received on behalf of Mr. F. W. Goodenough by Mr. J. C. Walker, who showed them the placards, advertisement matter, and other items of interest which the "B.C.G.A." produce.

The deputation were then conducted by Mr. J. E. Henwood, of the Gas Light and Coke Company, to see the magnificent showrooms at Kensington, and another smaller showroom of the Company. They were next taken back to their hotel, where lunch was served; Mr. Goodenough (Controller of Gas Sales of the Gas Light and Coke Company) presiding, supported by Mr. Walker (Secretary of the British Commercial Gas Association), Mr. Walter T. Dunn (Secretary of the Institution of Gas Engineers), and Mr. Leonard Hazel (Overseas Commercial Manager of Radiation Ltd.), whose interesting laboratories were shown to the French delegation.

After lunch there were one or two speeches, which were commendably short, having regard to the shortness of time available for the words of welcome from the Chairman and the words of acknowledgment from the guests. M. Mougin very ably acted as double interpreter, and, as usual, performed his duties in a manner which was equally satisfactory to the gentlemen of France as to their British confrères.

Mr. Goodenough specially dwelt upon the Institution's work in connection with the Education Scheme. He also referred to the ever-progressive policy of his great Company (the largest in the world). The decision of the Governor (Sir D. Milne-Watson) and Court of Directors to establish attractive showrooms in each district of their extensive area had resulted in an enormous increase of business, and had fully justified the large outlay entailed. He concluded by bidding them a very hearty British welcome.

The principal French guest, in acknowledging these remarks, said unfortunately in France they had no gas education system in operation. He and his colleagues had come to England to inquire about it. Nor had they any work being done which corresponded to that of the Gas Investigation Committee of the Institution of Gas Engineers; but his hearers might depend upon it they would as soon as possible see that these omissions were made good.

In the afternoon some of the guests were taken to see the

Front Row (seated), left to right: Mr. Jackson, MM. Bazille, Sarrade, Mlle. R. A. van Cleven, MM. Sellié, Simor Saint Just, Serville.
Second Row (standing): Mr. R. C. Rodgers, MM. Ferlet, Voyard, Tixier, Boutemy, Gros, Mr. A. W. Smith, MM. Mougin, Nerrière, Freynet, Reclus, Bureaux, Bing, Gros.

Woodall-Duckham system of vertical retorts at the Bow Common Station of the Gas Light and Coke Company; others proceeded to the Laboratories of the South Metropolitan Gas Company.

Early next morning (Tuesday) they were on their way to Nuneaton for an inspection of Mr. George Helps's process. They had a special reason for desiring to see it, as the process is now being advertised in France, and the visitors sought first-hand information at the fountain head.

In the afternoon, after being entertained at luncheon by the Lord Mayor of Birmingham, they visited the British Industries Fair.

BRITISH INDUSTRIES FAIR (LONDON SECTION).

GAS PROMINENT THROUGHOUT.

The London Section of this year's British Industries Fair is a truly remarkable advance on any of its predecessors—and this applies not only to the greater number of exhibitors but also to the attractive manner in which the entire display is staged. The exhibition at the White City strikes one not as a medley of exhibits but as a well-organized, co-ordinated whole. There is an atmosphere of energetic gaiety, of cheerful determination, which is bound to convert pessimism into optimism regarding Britain's industries and resources, and which is calculated to infuse lasting enthusiasm into the minds of apathetic "moan-birds."

CHEERFUL RADIANT HEAT.

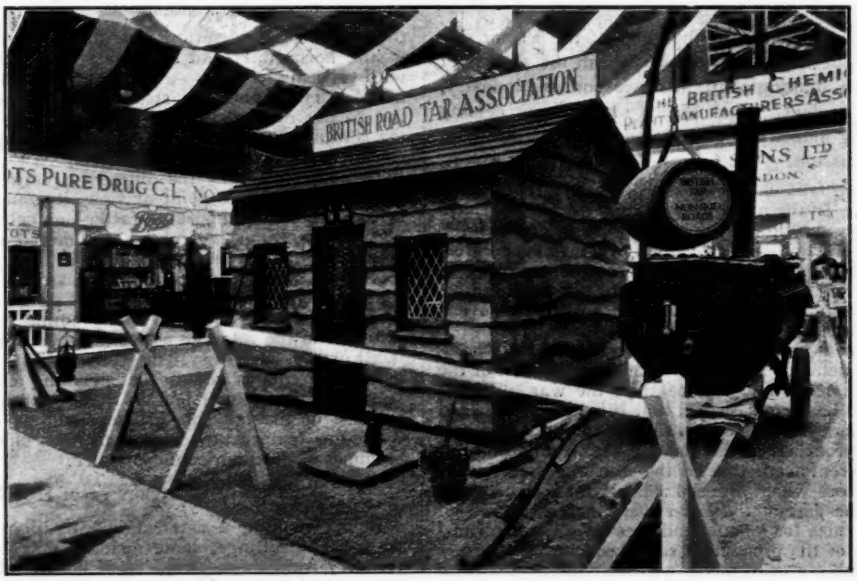
Now we are not in any way stretching a point when we say that gas adds enormously to the cheerful note at the White City. Throughout the halls of the exhibition one is conscious of the cheerfulness of the heating arrangements. The glow of 652 gas fires—for this is the number installed—ensures comfort and has an extraordinary tonic effect. These fires are arranged in pylons of four, and give warmth without discomfort. It is, of course, practically an impossibility, on financial grounds alone, to heat the White City in the accepted sense—that is, to raise the temperature of the air to normal domestic conditions. Any system of convective heating would be ruinous in regard to cost, besides being unpleasant in comparison with radiant heat which warms the visitors without heating the atmosphere. As a matter of fact there are only 98 gas "radiators" installed in the building, bringing the total gas-heating appliances to 750.

The Gas Light and Coke Company, who were responsible for the work, and who are to be congratulated on the results, left nothing to chance. Three 6-in. mains serve the building at different points, and the gas is metered by an 8000-light wet meter, a 1000-light wet meter, and four 3000-light dry meters. The daily consumption of gas amounts to over 500,000 c.ft., and a cold spell would quickly increase this. Of course, this vast consumption includes the gas cooking load in the exhibition—for all the kitchens are replete with gas equipment—and allows for the fact that some sections, such as the hall in which pianofortes are displayed, have to be heated throughout the 24 hours. As mentioned previously, there are many more exhibits at the White City than formerly; and to accommodate these, other halls have been brought into use. In these, 71 specially-constructed four-fire pylons—all-cast, readily-transportable units—have been installed.

GAS DISPLAYS.

Immediately on passing through the Shepherd's Bush entrance to the Fair, one is confronted by a decorative pylon which serves not only to show gas fires in a pleasing manner, but also to give the public some idea of the Company's showroom work. Above the fires are painted slides of the interior of the Company's showrooms at Kensington, Walham Green, and Golders Green. The slides on each pylon form a box which is gas-illuminated from the interior. Another of these decorative pylons is positioned near the Wood Lane entrance to the White City.

The stand of the Company is prominent for its lighting alone, apart from the attraction of a dynamic exhibit. A barrel of tar is the centre of a revolving table on which are set out various dyes, and other products, obtainable by tar distillation and treatment. For the general lighting of the exhibit there are six ventilating lamps of pleasing design operated by Sugg's distant-control device. In addition are six directive lighting meters ingeniously concealed. These illuminate the revolving table, bringing out the colours of the dyes to the best possible advantage, and also a show case containing liquid products of coal tar distillation in highly artistic flasks. The total candle-power of the lighting installation is 4500.



Nearby is the exhibit of the South Metropolitan Gas Company. Last year this took the form of an old wayside inn; but in the present exhibition the Company have staged a display of great originality. The setting is Egyptian, and the colouring is in red, blue, and yellow. The stand must be seen to be appreciated. Refined and subdued lighting, switch controlled, a "Metro" log fire, and a pitch model of Cleopatra's needle, inscribed on which, in chemical nomenclature, are the various products of coal tar, are items of the display, which is crowned by a golden vessel of coal.

BRITISH TAR, THE LIFE-PRESERVER.

Having basked in "Metro-Nile" sunshine, it was somewhat of a shock to be reminded, on seeing a near-by stand, that one of the reasons for laying-down a road appears to be the delight of pulling it up again. The exhibit to which we now refer is that of the British Road Tar Association—and a most effective exhibit, too! Here are all the signs that the "road is up." There is a tar boiler; and evidence of activity in road repairing, by way of picks and shovels, is at hand. The men have left their work, and have, presumably, retired to a roadside hut. Our curiosity aroused, we determine to investigate as to how long it will be before the road is reconditioned. Inside the hut, however, we are not met by the sight of a horny-handed son of the pick anticipating with pleasure the contents of a red handkerchief, but we find ourselves in a highly efficient information bureau, with experts in attendance. In a trice they explain why British tar makes better and safer roads—low first cost, durability, minimum maintenance charges, per-

manent non-skid surface, resiliency, dustless and waterproof; these and other phrases ring in our ears as we reluctantly make our exit. As part of the exhibit, there is an intriguing viscosity demonstration which is attracting a great deal of attention. On Feb. 20, the day the Fair was opened, the Duke and Duchess of York visited this stand, and evinced great interest in "British Tar for British Roads."

Not far away from these stands is the exhibit of Imperial Chemical Industries, Ltd.—a small but highly comfortable kinema theatre where are shown films demonstrating the amazing activities of this great organization. A feature of the exhibit is a well-prepared booklet relating to the formation of the Company and its products.

General Exhibits.

Finally, we will call attention to one or two of the general exhibits of particular interest to the gas industry. Pressure gauges and thermometers are shown by the Accurate Recording Instrument Company, Ltd., of Teddington; tar, intermediates, and dyestuffs by the Association of British Chemical Manufacturers, of Piccadilly, W. 1; ammonium salts, acids, coal tar products, dyestuffs, &c., by Brotherton & Co., Ltd., of Leeds; thermometers and pyrometers, by the Foster Instrument Company, of Letchworth; plant for tar distillation by W. J. Fraser & Co., Ltd., of Dagenham; heat and corrosion resisting steels by Hadfields, Ltd.; chemical and heat-resisting glassware by Hailwood & Ackroyd, Ltd., of Leeds; the "Kata" and other thermometers by J. J. Hicks, of Hatton Garden, E.C. 1; coal tar intermediates by Hickson & Partners, Ltd., of Castleford; scientific glassware and hydrometers by Howard, Rawson, & Co., Ltd., of Chelsea, S.W. 3; gas-operated absorption type refrigerators by the Ice Stove Company, Victoria Station House, S.W. 1; "Pyrex" laboratory glassware by James A. Jobling & Co., Ltd., of Sunderland; evaporators and heat interchangers by the Kestner Evaporator and Engineering Company, Ltd., of Grosvenor Gardens, S.W. 1; laboratory glassware by John Moncrieff, Ltd., of Perth; and a new type of lampshade by the Silglas Company, of Hendon, N.W. 9.

On the stand of Johnson, Matthey, & Co., Ltd., of Hatton Garden, E.C. 1, demonstrations of the melting of precious metals by gas are being given; the furnace employed being a Keith-Blackman. Gas is also used on the stands of the Lanston Monotype Corporation, Ltd., for type metal melting, and by Crosse & Blackwell, Ltd., for their cookery displays.

WASTE-HEAT RECOVERY.

By Major W. GREGSON, B.Sc., A.M.I.Mech.E., of Messrs. Spencer-Bonecourt, Ltd.

[From a Paper before the Institution of Mechanical Engineers at the Annual Meeting on Feb. 17.]

After a general introduction to the subject, the author discussed the problem of waste heat recovery from the aspects of steam raising in steel-making plant, in the carbonizing industry, and by marine oil engines. That section of the paper dealing with the carbonizing industry is reproduced here, together with the subsequent discussion.

Carbonizing plant falls into two divisions—(*a*) coke ovens and (*b*) gas retorts. In the near future a third division will have to be allowed for—*i.e.*, low-temperature carbonizing plants. Modern coke oven practice is to develop the highly regenerative oven in order to liberate as much surplus gas as possible, and waste heat recovery is only practicable on non-regenerative ovens, and in connection with steel plant, of which coke ovens generally form an integral part.

Whereas waste heat recovery in steel works has been practised to a certain extent for many years, the development of the gas-works application has taken place since the war. But its rate of development has been so rapid that it is now established practice on all modern settings of gas-making plant. The subject is naturally approached by the gas engineer from a point of view which is different from that of the iron and steel works engineer. The factors which aroused a lively interest in waste heat recovery on the part of the latter were increased costs of fuel and increased rates for labour, and these two items formed a heavy proportion of the production cost-sheet.

For the gas engineer a third factor was introduced—the price of coke breeze. Until he could find a reasonable market for the breeze, it meant that he had on hand an unsaleable product, useless except for his own works boilers. During the last decade developments in the utilization of coke breeze for fuel-fired boilers opened up a potential market for this bye-product, and the adoption of waste heat recovery instead of coke breeze for steam-raising was further accelerated (*a*) by the increasing demand for steam for process work in modern works—*e.g.*, for steaming retorts and other gas plant—and (*b*) by a general increase in power demands to replace operations performed by hand in the old days.

In ordinary gas-works practice, waste heat is available for steam-raising from retort settings, water gas plants, and hot coke. It has taken engineers a long time to realize that there are definite limits to regeneration as practised on producer-gas fired furnaces and retorts; and in the past low exhaust-gas temperatures have, erroneously, been looked upon as synonymous with high furnace efficiency. As a matter of fact, extremely low temperatures are invariably caused by excess air entering the system at various points, and it is necessary that in addition to temperatures the corresponding excess-air figures be known before the efficiency can be definitely determined.

The only criterion of furnace or retort efficiency is the amount of fuel used per unit of the primary product; and the maximum effective regeneration occurs when this factor is lowest. In practice, it is required that a sufficiently high temperature be attained from the producer gas-air mixture to give the requisite flame properties; and a simple calculation shows the futility of expecting the secondary air on a producer-gas fired unit to absorb more than approximately half of the heat in the resultant escaping gases, when the normal process of raw producer-gas firing is used.

Retort settings comprise the most important section of direct carbonizing plant. In general practice the continuous vertical retort gives a higher yield of steam per unit of producer fuel than the horizontal setting; the inclined setting is closely allied to the horizontal; and the latest developments in connection with vertical chambers—a form of intermittent vertical retort—has a varying potential steam yield according to design. As the greater number of existing carbonizing plants are of either the continuous vertical or the horizontal type, it is proposed to consider only these two types.

To appreciate fully the differences between the two systems from a heat-balance point of view, it is necessary to take into consideration an important factor—namely, the hot coke. In horizontal settings the coke is discharged at much higher temperatures than in vertical settings; in fact, about 25 p.ct. of the total heat given to the setting appears as sensible heat in the coke. In vertical retorts, where "steaming" is almost universal, the coke is cooled by the incoming steam, and the heat is returned to the retort to assist the chemical action occurring in it. Further, in one system (Glover-West) the ingoing secondary air circulates round the steaming chamber (the bottom section of the retort) and is thereby preheated, again at the expense of the hot coke. The result is, of course, a higher waste-gas temperature with a thermal efficiency equal to that obtained in good horizontal practice.

Heat Recovery from Hot Coke.

Before making a detailed investigation of the waste gases leaving the settings, some mention may be given to the heat recovery from the hot coke from horizontal settings. The system of coke quenching by inert gases, and the subsequent circulation of the hot gases through a waste-heat boiler, obtains some 785 lbs. of steam per ton of coal carbonized; or (to make comparison with waste-gas figures) assuming 16 cwt. of coke per ton of coal and 2·7 cwt. as fuel, leaving 13·3 cwt. to be dealt with by the recovery plant, some 2·6 lbs. per lb. of producer fuel. The author has previously suggested the extension of this quenching system to blast-furnace slag, using a similar type of plant; inert gas not being necessary in this case.

The following basic data represent good average gas-works practice, whether vertical or horizontal retorts are in use:

Calorific value of producer coke	12,000 B.Th.U. per lb. net.
Producer efficiency	86 p.ct.
Gas per ton of coke	214,000 c.ft.
Composition of gas—	
CO	25 p.ct.
H_2	8 ,,
CO_2	5 ,,
Nitrogen	62 ,,
	100
Calorific value of gas	108 B.Th.U. per c.ft. net.

Gases reduced to 230° C. at outlet of waste-heat boiler.

The combustion table per c.ft. of producer gas is as follows:

—	Vol., C.Ft.	Oxygen Required, C.Ft.	Products of Combustion, C.Ft.		
			CO_2.	Water Vapour.	Nitrogen.
CO	0·25	0·125	0·25	..	0·47
H_2	0·08	0·04	..	0·08	0·15
CO_2	0·05	..	0·05	..	..
N_2	0·62	..	..	..	0·62
Total.	1·00	0·165	0·30	0·08	1·24

The air required for theoretical combustion per c.ft. is 0·785 c.ft., consisting of 0·165 c.ft. of oxygen and 0·62 c.ft. of nitrogen. Table I. correlates the percentages of CO_2 and oxygen with varying proportions of excess air.

TABLE I.—*Proportions of Carbon Dioxide and Oxygen in Typical Waste Gases from Retort Settings.*

Excess Air, P.Ct.	CO_2, C.Ft.	Oxygen, C.Ft.	Total Vol., C.Ft.	Vol., C.Ft. (Water Condensed).	CO_2, P.Ct.	Oxygen, P.Ct.
0	0·30	..	1·62	1·54	19·5	..
50	0·30	0·09	2·02	1·94	15·5	4·65
100	0 30	0·17	2·41	2·33	12·9	7·3
150	0·30	0·26	2·81	2·73	11·0	9·5
200	0·30	0 34	3·20	3·12	9·65	10·9

The sensible heats per c.ft. of each constituent gas are given in Table II.

TABLE II.—*Sensible Heat in Exhaust Gases, B.Th.U. per C.Ft. from 0° C. as Basis.*

Temp. °C.	CO_2.	Water Vapour.	Nitrogen and Oxygen.
230	11·0	9·7	8·0
400	20 6	18·0	14·1
600	33·9	29·0	21·5
800	49·2	41·4	29·1
1000	66·4	55·1	37·0

Calculating as in the previous case, and making the same allowance of 7½ p.ct. for radiation and other indeterminate losses, the results summarized in Table III. are obtained.

TABLE III.—*Pounds of Steam per Lb. of Producer Coke.*

CO_2 (as Measured), P.Ct.	Excess Air, P.Ct.	Inlet Temperature.			
		400° C.	600° C.	800° C.	1000° C.
19·5	0	1·01	2·30	3·68	5·15
15·5	50	1·24	2·79	4·45	6·20
12·9	100	1·46	3·28	5·20	7 25
11·0	150	1·68	3·77	5·98	..
9·65	200	1·90	4·26	6·72	..

Conditions which are typical in practice are, for vertical settings, temperature 850° C. to 650° C., excess air 50 to 150 p.ct.; for horizontal settings, temperature 700° C. to 450° C., excess air 100 to 200 p.ct.

Water gas plants may be divided into two classes:

(1) Blue gas plants.
(2) Carburetted plants.

The general practice is to utilize the heat in the "blow" gases only, as the percentage of heat in the "run" gases is small compared with that in the blow sections, and further, the author's firm has conveniently adopted the system of one boiler for two plants where blow gases only are dealt with (the running of the plants being suitably synchronized), thereby considerably reducing capital cost.

As distinct from the steady flow in carbonizing plants, a water gas plant operates with a varying flow. The gases at the commencement of each blow period are almost entirely composed of inert elements and products of combustion; but as the blow progresses, free combustibles are mixed with the effluent gases, and must be properly burned before entering the boiler, by suitable air-blast arrangements.

The following are typical figures for a water gas plant making straight gas:

Capacity: 1 million c.ft. of gas per day.
Coke consumed during blow period, 890 lbs. per hour.
Proportion of carbon in coke, 92 p.ct.
Mean temperature of waste gases during blow period, 850° C.
Mean proportion of CO_2, 14 p.ct.
Blow gases completely burnt at boiler inlet—*i.e.*, no free CO.
Carbon consumption, 0·92 × 890 = 820 lbs. per hour.

One pound of carbon when burnt produces 30 c.ft. of CO_2 *plus* 114 c.ft. of nitrogen, giving a total of 144 c.ft. of products on theoretically complete combustion. Table IV. correlates the percentages of CO_2 and oxygen with varying proportions of excess air.

TABLE IV.—*Proportions of Carbon Dioxide and Oxygen in Typical Water Gas Plant Blow Gases.*

Excess Air, P.Ct.	CO_2, C.Ft.	Oxygen, C.Ft.	Total Vol., C.Ft.	CO_2, P.Ct.	Oxygen, P.Ct.
0	30	..	144	21	..
50	30	15	216	13·8	6·9
100	30	30	288	10·4	10·4
200	30	60	432	6·9	13·8

Since 14 p.ct. of CO_2 is given in the data, the amount of excess air in practice is about 50 p.ct. Hence the gases per lb. of coke and their heat content are as follows:

Gas.	Vol., C.Ft.		Sensible Heat from 850° C. to 230° C., B.Th.U.		Total Heat per Lb. of Coke, B.Th.U.
CO_2	30	×	42·5	=	1275
$N_2 + O_2$	186	×	23·1	=	4300
					5575

Then steam per hour, allowing 10 p.ct. loss due to radiation, &c., $= \frac{820 \times 5575}{966} \times 0\ 9 = 4250$ lbs. from and at 212° Fahr.

Now a plant of a capacity of 1 million c.ft. of gas a day, allowing for clinkering time, makes gas at the rate of approximately 44,000 c.ft. per hour. The steam yield by waste-heat recovery is therefore a little over 96 lbs. of steam per 1000 c.ft. of water gas—a figure which is sufficient to make the water-gas plant self-contained.

It should be noted that even during the blow period there is a certain amount of hydrogen present; but it is of such a varying amount that it is difficult to get true analyses. As it is a comparatively small item compared with the carbon content, its neglect does not seriously affect the calculations in this instance.

FIRE-TUBE AND WATER-TUBE BOILERS.

As already stated, where the waste gas conditions approximate to fuel-firing practice, the water-tube boiler is an extremely effective waste-heat boiler. The only advantages which the fire-tube boiler can claim under such conditions are its smaller size and its ability to stand high draught-drops without air infiltration. Where space is not a serious factor, the water-tube boiler can be of suitable dimensions to allow a large heating surface and a low draught-drop, thereby discounting the second of the fire-tube boiler's advantages. With low-grade gases, however, the draught problem becomes acute, as unlimited addition to the heating surface has obvious disadvantages. If the tubes of the water-tube boiler are closely spaced so as to effect continuous contact, the fan power becomes excessive, but the straight-run path of the fire-tube boiler is ideally suited to high gas-velocity practice, resulting in the high heat-transmission rates accompanying the phenomenon of turbulent flow which occurs when certain gas speeds are reached or exceeded.

Summing up, the water-tube boiler has a definite field for waste-heat recovery practice when the gases approach fuel-firing conditions, and this field can be extended by suitably disposing the tubes for better contact-heating effects, provided moderate draughts are employed.

For low-grade gases, particularly from regenerative furnaces, the fire-tube boiler has a practically unchallenged field owing to its suitability for high draught-drops coupled with high heat-transfer coefficients.

TYPICAL PERFORMANCE FIGURES.

Table V. sets forth some test figures obtained by the actual operating staff under ordinary working conditions on various types of gas-retort settings. One item gives the calculated results compared with actual results; and it will be noticed that the discrepancies are very small. Every care was taken in obtaining the readings; but in view of the difficulties in eliminating small errors, the table shows that the general trend of such errors is to balance each other in the complete sequence of factors which determine the results.

Practice has shown that the normal gas-works can meet the whole of its power and process requirements by means of waste-heat steam; and in this instance it must be remembered that comparatively small power units, with consequent low efficiencies, are involved.

In the author's opinion, the electricity supply and the gas-works in every town should be interlinked and under one control; such an arrangement having many advantages. The general scheme would be to use all coke breeze, and any other coke not required for sale, in high-pressure boilers; waste-heat recovery would be employed at medium pressures (to obtain the best quantitative results); and the steam from the two sources would be combined in mixed-pressure turbines, or alternatively a system of high and medium pressure turbines, "bleeding" low-temperature process steam. All works services would, of course, be electrified.

The gas-works of Great Britain carbonize some 16 million tons of coal per annum. Assuming that this coal uses 14 p.ct. of its weight of coke for carbonization, the total annual consumption of fuel-coke is 2,240,000 tons. With settings properly arranged for waste-heat recovery, 4 tons of steam per ton of coke would be an average figure to represent both modern vertical retort practice and modern regenerative horizontal retort practice. Therefore, nearly 9 million tons of steam would be available. Before the advent of waste-heat recovery practice, gas-works steam was generated from coke breeze at (say)

TABLE V.—*Test Results from Waste-Heat Recovery Plant on Gas-Retort Settings.*

—	Vertical Retort Settings.			Horizontal Retort Settings.		
1. Gas-Works	Nine Elms (Gas Light and Coke Company).	Oldbury.	Hull (British Gas Light Company).	Beckton (Gas Light and Coke Company).	Bromley (Gas Light and Coke Company).	Croydon.
2. Type of Retort	Glover-West.	Glover-West.	Woodall-Duckham, with Regeneration.	Drakes, with Regeneration.	Gibbons, with Regeneration.	Drakes, with Regeneration.
3. Fuel per hour, lbs. of coke	7,060	590	880	4,000	6,300	1,075
4. Calorific value of fuel (lower), B.Th.U. per lb.	12,000	12,000	12,000	12,000	12,000	12,000
5. Temperature of gases at boiler inlet = T_1	800° C.	850° C.	582° C.	655° C.	699° C.	460° C.
6. Temperature of gases at boiler outlet = T_2	230° C.	195° C.	228° C.	243° C.	222° C.	199° C.
7. CO_2 content in waste gases, p.ct.	12·4	14·4	12·5	14·0	16·3	9·8
8. Equivalent excess air, p.ct.	113	75	110	80	40	200
9. Number of boilers under test	2*	1	1†	2	4	1
10. Total heating surface, sq. ft.	6880	1420	1220	6880	8800	1850
11. Duration of test	16 hours	24 hours‡	72 hours	16 hours	12 hours	28 days
12. Average steam pressure, lbs. per sq. in.	115	85	99	155	67½	100
13. Saturated steam temperature = T_3	374° F. (175° C.)	328° F. (165° C.)	338° F. (170° C.)	368° F. (187° C.)	314° F. (157° C.)	338° F. (170° C.)
14. Superheat	95° Fahr.	247° Fahr.	106° Fahr.	127° Fahr.	..	92° Fahr.
15. Feed temperature	90° Fahr.	52° Fahr.	199° Fahr.	160° Fahr.	130° Fahr.	134° Fahr.
16. Evaporation per hour, actual, lbs.	30,000	2390	3340	13,250	22,400	3213
17. Evaporation factor	1·25	1·37	1·11	1·17	1·12	1·17
18. Evaporation per hour from and at 212° Fahr., lbs.	37,500	3275	3710	13,250	22,400	3213
19. Evaporation per hour, per lb. of fuel, lbs.	5·3	5·55	4·21	3·4	3·55	2·98
20. Evaporation per hour, per sq. ft. of heating surface, lbs.	5·45	2·30	3·04	1·93	2 54	1·74
21. Total fan horse-power	134	3	§	‖	100	19½
22. Steam equivalent of fan power, lbs.	2948	105	§	‖	2500	468
23. 22 as percentage of total steam	7·8	3·2	..	..	11½	14½
24. Extraction efficiency $= \frac{T_1 - T_2}{T_1 - T_3} \times 100$ p.ct.	91	95·5	86	88	88	90
25. Calculated evaporation per lb. fuel, assuming 86 p.ct. producer efficiency, lbs.	5·4	5·6	4·15	3·4	2·55	2·95
26. Percentage difference between (19) and (25)	1·9	0·9	1·4	..	..	1·0
27. Method of measuring evaporation	Tank	Tank	Water meter	Tank and steam meter	Tank	Water meter

* This installation consists of three boilers (two working and one stand-by). † One of two boilers, each taking the waste gases from half the installation of settings. ‡ Gas plant operating at approximately half rated output when test was made. § Fan driven by geared turbine and all exhaust steam utilized by feed-heater to raise initial feed to 199° Fahr. ‖ Fans driven by geared turbines and all exhaust utilized by feed-heater to raise initial feed to 160° Fahr.

6 tons of steam per ton of breeze. Therefore, waste-heat recovery adopted throughout our home works would represent 1,500,000 tons of coke breeze saved for other purposes. At 10s. per ton, this is equivalent to £750,000.

Discussion.

Mr. R. C. MACDONALD (South Metropolitan Gas Company) remarked that the first waste-heat boiler of which he had experience was one attached to a strip-heating furnace installed in a tube works. The waste gases from the furnace passed along the side of the flues, and returned to the shaft through a boiler consisting of what amounted to two eccentric cylinders, the inner one of which had a diameter of 5 ft. This boiler was most inefficient, and yet it supplied all the steam necessary for driving the hydraulic machinery at the works. The second boiler with which he came in contact was an old locomotive boiler of the portable type attached to a large internal combustion gas engine. The results from this were very satisfactory. In his paper the author had given a diagram showing the lay-out of a steel plant absorbing all the surplus gas and utilizing all waste heat and coke oven waste products. He (the speaker) had seen a works in Middlesbrough where the gas from the blast processes was employed for raising steam which was used for evaporating salt. Major Gregson had given his reasons for preferring the fire-tube boiler for waste-heat recovery; but it seemed to him (the speaker) that, provided the tubes were kept clean, it did not really matter, from the point of view of heat transference, which type of waste-heat boiler was employed—the fire-tube or the water-tube. Waste gases were usually charged with a considerable quantity of dust and other foreign bodies, which were deposited on the surface of the tubes. This deposit naturally reduced the efficiency of heat transfer. Provided the water supply was fairly pure, there was no doubt that the fire-tube boiler presented many advantages, because of the ease of cleaning the tubes. On the other hand, where the waste gases were fairly clean, then the water-tube boiler was equally satisfactory. Formerly, continued Mr. Macdonald, they had looked upon the water side of the boiler as the source of trouble; but now, with softening carried out to zero hardness, there was not the same difficulty. He would ask the author whether, in case of softening to zero hardness, it was necessary to de-gas the water before it was supplied to the boiler. If this was necessary, what was the type of de-gas used? In the case of boilers working intermittently, did he find that trouble was caused due to depositon? In regard to the employment of waste heat in gas-works, the author was most optimistic in assuming that all the steam needed on the works could be provided by waste heat. He appeared to have neglected the influence of a fluctuating load. It had been stated in the paper that 5 lbs. of steam could be raised per pound of fuel used in the producer. In the chart showing the amount of steam from and at 212° Fahr. raised per pound of producer coke, it would be seen that at 600° C., which was a common figure for the temperature of waste gases leaving a retort setting, 3 to 4 lbs. of steam could be raised per pound of coke. This, said Mr. Macdonald, was a correct figure for a properly-designed plant working under good conditions. If 5 lbs. of steam were produced per lb. of coke, then, in practice, it would be discovered that the retorts were leaking, and the escaping gases were being pulled through the boiler.

RECOVERY OF HEAT FROM ENGINE EXHAUST.

Mr. F. H. LIVENS confirmed the author's figures relating to the performance of waste-heat boilers attached to gas engines and oil engines. Major Gregson had stated that 2½ lbs. of steam could be raised per brake horse-power. This was a common figure; and in some tests which he (the speaker) had carried out, the results were even better than this. There were so many variables to be taken into consideration that it was impossible to give figures which would apply in every case. The closer the boiler was placed to the cylinder of the engine, the better. The best results would be obtained if the boiler could adjoin the cylinder; but such an arrangement was, of course, impracticable. He had experience of 500 H.P. oil engines coupled to exhaust heaters where it was advantageous to secure a supply of hot water; and, roughly speaking, with the exhaust gases at 650° Fahr., 1070 B.Th.U. per brake horse-power could be recovered when the load factor was between 66 and 70 p.ct. The water obtained had a rise in temperature of 84° Fahr. It was necessary to have storage for the hot water, and it was essential that this should be well insulated against radiation losses. When the engines were on quarter load, the heat in the exhaust gases was of little or no service. In a gas engine, 13 lbs. of hot exhaust were developed per brake horse-power. Here the temperature of the exhaust gases was in the neighbourhood of 950° Fahr., and it became possible to obtain steam pressure—as much, even, as 100 lbs. per sq. in., though 60 lbs. per sq. in. was a more practical figure. There was great difficulty, in making tests on different arrangements, to obtain consistent results, on account of the many variable factors. While Major Gregson's calculations were most interesting, it was their experience that, if they could get a result which could be expressed in round figures, without decimals, the accuracy of the statement was amply sufficient. Even a slight deposit on the tubes of the boiler upset the results. At the same time, concluded Mr. Livens, waste-heat boilers were very valuable; and all ways of saving fuel should be most carefully considered.

AUXILIARY FIRING OF WASTE-HEAT BOILERS.

Mr. J. REBER (Woodall-Duckham Company) agreed with the author that the expression waste-heat boilers was not quite correct, and that the term surplus-heat boilers was better. The paper indicated that the author did not favour the auxiliary firing of such boilers. He (the speaker) had data for the working of waste-heat boilers in connection with a setting of horizontal retorts. These boilers were

capable of raising 2500 lbs. per hour from the waste gases from the setting alone. By supplementing the heat by an auxiliary coke-fired producer, another 2500 lbs. per hour could be raised. The steam raised by this auxiliary amounted to 8 lbs. per pound of coke fired to the producer. The total volume of the gases to be dealt with by the fan was only increased by about 67 p.ct., though the output of steam, as he had said, was doubled; and this extra volume of gases had practically no effect on the fan. He had noticed that Major Gregson relied on the specific heats as found by Mallard and Le Chatelier. Recent work had shown that their figures were too high. According to Le Chatelier the specific heats of water vapour and carbon dioxide at 1000° C. were 54 B.Th.U. per c.ft. and 57 B.Th.U. per c.ft. respectively. More correct values, he thought, would be 42 B.Th.U. and 52 B.Th.U. for the same temperature range. It would be a very great advantage if there was international standardization of data used for the working-out of heat balances.

Question of Running Costs.

Mr. W. H. PATCHELL remarked that ten years ago he had experience of waste-heat boilers working in conjunction with 500 B.H.P. producer gas engines. The boilers were of the fire-tube type; and he gave particulars about them in a paper which he read before the Institution of Electrical Engineers in 1920. On one gas engine the steam raised amounted to 2·15 lbs. per B.H.P.; two more gave a figure of 2·19 lbs. per B.H.P.; and another gave 1·92 lbs. Fitted to the Diesel oil engines, waste-heat boilers gave 2·07 lbs. of steam per B.H.P. The differences between these figures were due to the position of the heaters. With regard to repairs, one boiler ran for 30,150 hours without being retubed, another for 28,391 hours, another for 35,057 hours, and another for 33,843 hours. Retubing was the only expense; and there was no doubt that waste-heat boilers were a commercial proposition. The tests to which he had referred were taken at full load; and he would add that, with the Diesel engine, the heat recovery on low load was much inferior to that with the gas engines on low load. The efficiency of gas engines decreased rapidly as the load was reduced; and in comparison with oil engines, the heat in the exhaust gases was proportionately greater.

The "Thimble-Tube" Boiler.

Mr. THOMAS CLARKSON said that he was particularly interested in the third section of the paper—that relating to the use of waste-heat boilers on marine engines. The question of waste-heat recovery in steel works and gas-works was very different from that obtaining with the internal combustion engine, for in the former case the boilers operated at a relatively high temperature, which made the problem comparatively simple. Such, however, was not the case with internal combustion engines, where the temperature of the exhaust gases was low; and for this work a specially-designed boiler was necessary. The fire-tube boiler gave a large amount of surface, but, to obtain the necessary turbulence and velocity of flow, which was needed to ensure efficient heat transfer, the tubes would have to be very long in relation to their diameter. Efficiency depended on the intimacy of contact between the heating surface and the waste gases. He was glad that Major Gregson had recognized the existence of the thimble-tube boiler. Regarding this, it was a fact that only recently a member of their Institution had said that a thimble-tube boiler might be used for heating water, but not for steam raising. This was an extraordinary statement when it was borne in mind that at the present time no less than 70,000 lbs. of steam per hour were being produced by this type of boiler working in conjunction with marine engines. Waste-heat boilers, if correctly designed, said Mr. Clarkson, could, and should, take the place of a silencer. At times a large quantity of hot water was not needed; and it was in such instances that what he would term the amphibious boiler proved advantageous. This could be run dry when it was so desired, for the temperature of the exhaust gases was not sufficiently high to affect the steel adversely. Thimble-tube boilers, concluded Mr. Clarkson, could raise steam at 100 lbs. per sq. in. At present a thimble-tube boiler coupled to a 4000 B.H.P. oil engine was evaporating no less than 4000 lbs. of steam per hour. In some cases, the boilers were being employed as silencers, running dry, in the summer, and as steam-raisers in the winter.

Corrosion.

Mr. H. A. D. ACLAND (Still Engine Company) remarked that he was glad to hear the author's endorsement of the attempt to lay the bugbear of acid corrosion. There was no greater fallacy than the notion that the utilization of waste gases must result in corrosion. So long as the temperature of the gases was higher than the dewpoint of the moisture contained in them—moisture taken in by the air used for combustion, and that resulting from the hydrogen content of the fuel—then no corrosion could occur. He was surprised that the author had made light of the feed water heater. Perhaps this was because of the thought that, at the outlet end of the feed heater, the temperature having fallen, there was more probability of condensation of the water vapour, and the absorption of sulphur dioxide and sulphur trioxide by this water. Well, cast iron was not at all a bad metal for feed heaters. It was little attacked by acid condensation, and it was cheap to replace. A feed heater had been fitted to one of his experimental engines. After fifteen years' use the gas side of the heater was still in excellent condition, and there was no acid corrosion. Trials carried out by the Institution of Naval Architects had shown that a feed heater was a commercial proposition.

Mr. A. E. L. CHORLTON regretted that some portion of the paper had not been devoted to a description of waste-heat boilers. He had once spent much energy in designing waste-heat boilers. It was only comparatively recently that it had been discovered that a waste-heat boiler needed to be small. All the original boilers were too large, with the result that corrosion troubles were invariably experienced.

Theoretical Calculation of Results.

Mr. TAYLOR observed that one or two of the speakers had rather suggested that it was very difficult to know with any precision what waste-heat boilers would do. Well, Mr. Lawford Fry, whose work had been referred to in technical journals in this country, had set up a law for the flow of heat through the surfaces of gas tubes. Prior to this there had been a good many experiments, but practically no agreement on the question. He (the speaker) had tested Mr. Fry's law in relation to a waste-heat boiler. He had calculated the temperature he ought to get; and the figure thus found was always very close to the actual obtained. If one knew how much gas there was to deal with, and the temperature of this gas, it was now possible by a theoretical calculation to arrive at a result which would be more or less substantiated in practice. A point of special interest was that the temperature of the gases leaving a waste-heat boiler was fairly constant, though the temperature of the gases at the inlet to the boiler might vary widely.

Mr. ADAMSON said there could be no doubt that waste-heat boilers were commercially sound. This country had only begun to consider their application seriously, and yet 250,000 tons of coal were already being saved each year by their use. In the United States, one boiler maker alone claimed to save 200,000 tons of coal per annum; and in that country it was stated that 1600 lbs. of steam could be raised for every 100 lbs. of steel made. In Germany 100 million kilowatt-hours were produced from waste-heat every year. It would be a good thing if those controlling steel-making in this country would grasp the economic possibilities which improved plant would enable them to achieve. On a visit to America a few months ago, he saw a notice in Chicago, which read: "Throw away your hammer, and buy a horn." He discovered that this meant: Drop pessimism; boost the business. If mechanical engineers in this country would take this as a text, great improvement would be the result.

The Author's Reply.

Major GREGSON, replying to the discussion, stated that he must at once join issue with Mr. Macdonald over the question of the merits of the water-tube boiler for low-grade gases, except in special circumstances, and to do this would refer Mr. Macdonald to the paper itself. Mr. Macdonald had raised the question of the softening of London water. He (the speaker) had found no difficulty in dealing with London water, and there were at least half-a-dozen firms of repute who put forward entirely satisfactory apparatus. Regarding the effect of water of zero hardness, his own practice was to avoid zero hardness by by-passing a small proportion of hard water. He had come across no case of wasting of the fire-tubes under the conditions mentioned by Mr. Macdonald. The question had been raised of the possibility of waste-heat boilers carrying the full gas-works load, having in view the varying fluctuations in demand; but he would remind Mr. Macdonald that there were a considerable number of gas-works in operation at the present day which were carrying on continuously on their waste-heat boiler steam alone. This appeared to be the best answer to this point. Mr. Macdonald had also questioned the figure of 5 lbs. of steam per lb. of coke on carbonizing plants, but the author would refer Mr. Macdonald to the instances quoted, all of which represented modern carbonizing plants. High waste-gas temperatures were common on modern carbonizing plants of the non-regenerative and semi-regenerative types; and such plants operated at high over-all thermal efficiency as carbonizing units for the reasons explained in the paper. He appreciated Mr. Livens' remarks regarding waste-heat recovery on internal combustion engines. He would point out to Mr. Livens that all the figures on which his calculations and examples were based were taken from actual practice, and were not assumed. Mr. Livens stated there were difficulties in obtaining accurate tests, but he (Major Gregson) had not found any great obstacles in this direction, except in certain cases where it was difficult to isolate individual units. Mr. Livens had rather stressed the unimportance of decimals in the calculations and figures given; but it should be appreciated that when one was dealing—as, for example, in the case of oil engines—with a recovery figure in the region of 1 lb. of steam per B.H.P. per hour, the decimal figure really represented a big fraction of the whole. He also greatly appreciated Mr. Reber's remarks. Mr. Reber had championed the dual-fired boiler as instanced by the installation at Redditch; but he (Major Gregson) had rather looked upon Redditch as the exception which proved the more general rule. The author's own opinion was that, excepting in special cases, better over-all results could be obtained by separating the functions of waste-heat recovery and auxiliary firing, except for intermittent or emergency services. Mr. Reber's remarks regarding specific heats opened up a really vital question. The author himself had found that the Mallard's and Le Chatelier's figures appeared incorrect for the higher temperature ranges, but that within the limits used in waste-heat boiler practice they conformed very closely with other authorities. Hence he had adhered to them. The importance of the point raised by Mr. Reber regarding the standardization of basic data for engineering calculations was one which could not be over-emphasized. It merited the serious consideration of the Institution as a body. The author agreed with Mr. Clarkson that the heavy turbulence in the thimble-tube boiler resulted in a very high degree of heat extraction even with the lowest grade gases, but he would remind Mr. Clarkson that this was done at the expense of considerable back-pressure; and Mr. Clarkson's contention that there was no back-pressure could not be considered strictly correct. The author thought that the correct interpretation was that there was no additional back-pressure on the engine system—*i.e.*, that the back-pressure put up by the thimble-tube boiler was no more than that of the silencer which the waste-heat boiler replaced. He was prepared, on the lines of Mr. Clarkson, to run a firetube boiler "dry" on an oil engine, as the temperatures were comparatively low throughout, but what he (the author) objected to was the possibility of cold water being suddenly turned into the boiler when in that condition. He appreciated that Mr. Clarkson had actually run a thimble-tube boiler under these conditions, and had turned cold water into the boiler when hot and dry; but he (Major Gregson) maintained that it was extraordinarily bad practice, as one could not expect to ill-treat a boiler in that way

many times without meeting trouble. Mr. Acland had referred to the use of the feed heater in series with the waste-heat boiler; but in normal oil engine practice this would only result in an excess of hot water. On the Still engine, this hot water was, of course, flashed into steam in the auxiliary circuit. Mr. Chorlton had expressed regret that no description of a waste-heat boiler had been given. He (the speaker) would remind them that the title of his paper was "Waste-heat Recovery," not "Waste-heat Boilers." Finally, Major Gregson said that one of the reasons why waste-heat boilers were not acceptable to some engineers was psychological. It was difficult to get individuals to realize that economically everything had been changed by the war, and that it would be possible for the leading industries to enjoy a modicum of prosperity if executives would reorganize their plant and methods on lines compatible with to-day's requirements. In other countries they were reorganizing on a post-war basis. Here, unfortunately, it was otherwise.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

A Meeting of the Western District was held in the Royal Technical College, Glasgow, on Feb. 11, Mr. ROBERT FIFE (Kilmarnock) presiding.

The CHAIRMAN intimated that the closing meeting of the session was now fixed for April 14, and that the speaker would be Mr. W. M. Mason, Manager of the British Commercial Gas Association. The usual social evening would follow the business meeting. He had pleasure in informing those present that two of their members had recently received important appointments. Mr. J. Boyle, of Greenock, had been appointed Works Superintendent at Hereford, and Mr. D. Garrie, of Glasgow, Assistant Manager at Burntisland. On behalf of the Association he congratulated both gentlemen, and wished them every success.

CONTROL OF CALORIFIC VALUE.

By WILLIAM SCOTT, Chief Chemist, Tradeston Works, Glasgow.

From the point of view of calorific value, the primary consideration is quality of coals. In classifying coals, great stress should be laid on the percentage of ash, including that present as unscreened stone, and that inherent in the coal. Low ash generally indicates reliability for gas-making, even though the gas yield be slightly lower than in the case of a higher ash coal. The former will prove more economical in the end, and the resultant coke will be more useful in the producer.

When a high ash coal is put into the retort, the heat is not conducted equally and quickly through the mass. Hence incomplete carbonization results. Again, when the coke from this coal goes into the producer, it is incompletely burned, and the ash sooner or later chokes the flues, resulting in bad heats. High-ash coals generally contain more sulphur and phosphorus than those of the low-ash variety. The sulphur throws extra work on the purifiers, while the phosphorus tends to flux the retorts, which leads to cracks and chokes. First consideration, then, should be given to coals with low ash, combined with the other qualities—*i.e.*, gas-making, bye-products, &c.

Gas plant will not work efficiently with unsuitable material. It is bad policy to mix coals, good, bad, and indifferent, from several pits. It is better to procure a uniform material, to ensure economical and uniform working.

In most large works an assortment of coals varying in ash content from 3 p.ct. to 15 p.ct. is used. One can realize the difficulties encountered when operating under such conditions.

THE HORIZONTAL RETORT.

The horizontal retort is maintaining its position among modern coal carbonizing plant. At the Tradeston Works the carbonization plant consists wholly of horizontals of two types; blue water gas being employed for dilution. In one of the retort houses there are two benches, of seven and eight double ovens respectively. There are twelve Ω-shaped retorts set in four tiers in each oven; each retort being 21 in. by 15 in. by 9 ft. long over-all, with stop ends set back to back. In the two benches there are 360 retorts. The duration of the charges is four hours, forty-eight minutes; and the approximate make is 2 million c.ft. The construction of the setting has not been without alteration and modification in order to meet requirements.

A few years ago the Glasgow Corporation decided to reconstruct one of the retort houses at Tradeston, and installed two benches, each consisting of six beds of ten horizontals through Ω-shaped retorts each 24 in. by 18 in. by 23 ft. long, arranged in five tiers and operated by a combined charging and discharging machine.

The producer and regenerative system has undergone considerable alteration as regards design and dimensions, with the view of increasing efficiencies—a point which has been achieved. The combustion chamber and retorts are composed of silica, enabling working at high temperatures. The retorts are built in segments. This method has proved of great advantage, for, if the retort cracks, the damage is confined to one segment. This design of retort has increased the life. The segments affected can be replaced, so that the maintenance cost is much less than that of the ordinary fireclay moulded retort.

This new setting has been in operation for a period of about two years; and some interesting data have been obtained of the working results. Each setting has been working with its own producer; and the results, so far, have been highly satisfactory.

The following are figures over a period of fourteen days:

Duration of charges	12 hours.
Coal carbonized	2967·45 tons.
Gas made	45,284,000 c.ft.
Make per ton (corrected)	15,260 ,,
Average calorific value	471·1 B.Th.U.
Therms per ton	71·89
Coke made	1780·47 tons.
Coke used in producers	372·0 ,,
Coke available for sale per ton of coal carbonized	8·4 cwt.
Coke consumed in producers per ton of coal carbonized	2·5 ,,

Average analysis of gas made during the 24 hours:

	P.Ct.
CO_2	3·1
C_nH_m	4·5
O_2	0·5
CO	9·5
CH_4	31·6
H_2	41·1
N_2	9·7
	100·0

Calculated C.V. = 599·0 B.Th.U.

The coals used are of a coking nature and are a mixture of screened, unscreened, doubles, pearls, and singles, drawn mostly from Lanarkshire seams; the proximate analysis being as follows:

Moisture . . 7·4 p.ct.

	P.Ct.
Organic volatile matter	33·0
Ash	7·3
Fixed carbon	59·7
	100·0

The average coke consumption on producers varies from 12 to 13 lbs. per 100 lbs. of coal carbonized.

The coke produced is of good quality, of close to medium structure, and is hard. The average ash content is 10·5 p.ct.

Careful observations are taken twice daily to ascertain the heating efficiency of the settings; readings being taken with a Foster optical pyrometer. The settings are on 12-hour carbonizing operated in two 8-hour shifts and 4-hour periods between shifts. The normal weight of charge is 17½ cwt. per retort. The average temperature maintained in the combustion chambers is 1280° to 1300° C. This temperature is found to be sufficient to ensure complete carbonization within the period of twelve hours.

The balance of heat is fairly well maintained throughout the settings. The average carbon dioxide content is about 16·5 p.ct. There is a slight excess of oxygen, but this does not reach 1 p.ct. The producers work with little clinkering, and easily maintain the temperatures with the combustion chambers under slight pressure.

BLUE WATER GAS.

There are two sets of blue water gas plant, which were supplied and erected by Messrs. Humphreys & Glasgow, Ltd., and placed on the site of a horizontal retort bench which was worn out. Each set consists of generator, recuperator, waste-heat upright multitubular steam boiler, with blast products and smoke stack, and also washer and gas connections. There are two De Laval turbines, single rotors, developing 50 H.P. at 100 lbs. pressure coupled to helical reducing gear.

The turbine runs at 1400 R.M.P. and is attached to a 48-in. Sturtevant fan. It gives a constant air pressure of 20 in. water column. There are also vertical steam feed pumps and a feed water heater.

The rated capacity of each set is one million c.ft. per 24 hours. With a good coke it is possible to get 1¼ million c.ft. per set. The relief gasholder is spiral guided of 230,000 c.ft. capacity. Both sets can be worked simultaneously from one air-blast by simply arranging the time of the "blow" period. The results obtained from this plant are very satisfactory, taking into consideration the quality of coke used.

Clinkering of the generator is carried out three times in the 24 hours. During the first clinkering period each day, after the fire has been thoroughly cleaned from the clinkering doors, the men go to the charging platform, and pinch from the top any clinker adhering to the side of the generator. Should the clinker thus removed be extraordinarily large, the clinkering doors are opened and the clinker is removed. These arrange-

ments have enabled the management to run a generator for over six months without a stop. The depth of fuel in the generator averages about 7 ft.

Coke used for gasmaking per generator per day	21 tons.
Make per run	4,500 c.ft.
Make per ton of coke used	53,750 ,,
Coke per 1000 c.ft.	42 lbs.
Calorific value	300 B.Th.U.

The plant is operated on a six-minute cycle—one-and-a-half minute blow, and four-and-a-half minutes gas making. Immediately after coking periods there is an extra two minutes blow to raise the temperature of the fuel bed.

Analysis of blue water gas:

	P.Ct.
CO_2	3·2
O_2	*Nil*
CO	41·2
CH_4	1·4
H_2	45·6
N_2	8·6
	100·0

Calculated C.V. = 301·4 B.Th.U.

The gas industry made one of its greatest advances when the production of water gas was introduced in this country. This process has proved to be one by means of which the heat energy of the coal may be realized in the form of a permanent gas in the minimum of time and with the minimum of expenditure.

The production of blue water gas is an extremely sensitive operation, the actual conditions prevailing having a very far reaching influence.

The coke supplied to a water gas plant should receive the same careful consideration as coal for the retort house. As far as possible, part of the gas-making plant should be set aside for supplying coke for the water gas plant. Only coals possessing good coking properties should be used; for if unsuitable fuel be supplied to a water gas plant, poor results must be expected. The coke should be carefully riddled before being put into the generator, and should be of uniform size and shape. The blast is able to penetrate the coke mass more rapidly, due to the open nature, and thus the temperature of the fuel-bed is raised more quickly. In a like manner the steam admitted during the run period is able to penetrate more easily the porous structure of the coke, and so produce higher gas yields. In good blue water gas practice a calorific value of 290 to 320 B.Th.U. per c.ft. may be obtained.

Method of Control.

The blue water gas is regulated before entering the foul gas main. The advantage of admitting it at this point is that it may automatically carburet itself with light oil vapours which would otherwise be condensed and sent to the tar well. It is advisable to have it at the same temperature as the coal gas which it will meet, so that its introduction cold shall not chill the crude gas. When thus introduced, it will undoubtedly pick-up and retain some of the hydrocarbon vapours, and thus show an enhanced B.Th.U. production per ton of coal used.

The water gas is regulated into the foul main through an 8-in. valve, according to requirements; the surplus going into a relief holder. To ensure a reasonably steady quality of gas at the inlet to the holders, a Simmance-Abady recording calorimeter is installed in the meter house. This instrument, regularly attended to, and kept thoroughly clean, has proved very satisfactory. Some time ago a Boys calorimeter was installed alongside, and when tests were made, the recording calorimeter was correct to within 6 B.Th.U. There is also a jet photometer and a " Sigma " B.Th.U. indicator in the meter house. These are used only if the recorder should go out of action.

The declared value of Glasgow gas is 470 B.Th.U. The following is the average analysis of the outlet gas for a year:

	P.Ct.
CO_2	4·1
C_nH_m	2·8
O_2	1·5
CO	14·8
CH_4	21·3
H_2	42·2
N_2	13·3
	100·0

Calculated calorific value	473·2 B.Th.U.
Actual ,, ,,	477·3 ,,

Loss of Calorific Value in Mains.

The all-important matter to the consumer is the quality and pressure of the gas at the point of consumption. It is sometimes said that tests for calorific value should be taken on the district, as unduly favourable tests can be obtained in the works.

A few years ago several tests of the gas were made for analysis from the 36-in. main extending from Provan to the Tradeston Gas-Works. Samples were taken at eight different points of the main, and analyzed. The following figures show that there is little or no depreciation.

—	Gas at Provan.	Gas at Terminus.	Average of Tests.
	P.Ct.	P.Ct.	P.Ct.
CO_2	6·5	6·6	6·3
C_nH_m	2·9	2·8	2·8
O_2	0·4	0·9	0·6
CO	15·5	15·4	15·5
CH_4	20·0	20·7	20·6
H_2	51·1	49·8	49·1
N_2	3·6	3·8	5·1
	100·0	100·0	100·0

Calculated C.V., 494·0 B.Th.U. .. 494·0 B.Th.U. .. 491·0 B.Th.U.

Similar tests were made on the trunk main between the Provan and the Dawsholm Stations, and again between Dawsholm and the terminus touching the Dumbarton gas area. Practically no variation was recorded.

Control of Gas Production.

Working statistics may be used to forecast production, having regard to the calorific value declared. In the transition from winter to summer load one is faced with a gradually decreasing consumption; but production is decreased in definite steps. The following figures relating to throughput and reduction of gas-making plant are submitted.

Example.

Total daily make of town gas	5,300,000 c.ft.
Throughput	335 tons
Make per ton	15,802 c.ft.
Calorific value	470 B.Th.U.
Therms	74·06

This was composed of:

Straight coal gas	3,650,000 c.ft.
Blue water gas	1,650,000 ,,
By reducing the throughput to	270 tons
The straight coal gas would be	2,682,000 c.ft.

With same daily quantity of blue water gas, the production would then be:

Straight coal gas	2,682,000 c.ft.
Blue water gas	1,650,000 ,,
Total daily make	4,332,000 ,,
Make per ton	16,044 ,,
Calorific value	470 B.Th.U.
Therms	75·4

These figures indicate that no reduction in blue water gas production would be required, and would give admirable working conditions.

A figure of 9500 c.ft. per ton of coal at a calorific value of 600 B.Th.U., obtained from the average of a month's analyses, was used for the straight coal gas figures.

Comparison of Gas Yields with Varying Throughput.

—	Maximum.	Average.	Minimum.
Coal carbonized, tons	200	170	125
Straight coal gas, c.ft.	2,126,000	1,764,000	1,217,000
Blue water gas, c.ft.	825,000	825,000	825,000
P.ct. blue water gas	27·8	31·7	40·2
C.ft. per ton	14,750	15,230	16,330
Calorific value, B.Th.U.	470	470	470
Therms per ton	69·2	71·6	76·8
Daily production, c.ft.	2,951,000	2,589,000	2,042,000

The above comparison indicates increased thermal and gaseous yields due to increased proportion of water gas. Any increase in yield of gas coal per ton would give a further increase in therms. These figures are based on an output of 825,000 c.ft. of blue water gas per 24 hours.

The figures for the financial years 1925-1926 and 1926-1927 are given below:

Tradeston Station.

—	1925–26.	1926–27.
Coal carbonized, tons	69,455	91,874
Total gas made, c.ft.	943,880,000	1,347,852,000
Blue water gas, c.ft.	273,320,000	388,110,000
Make per ton (mixture), c.ft.	13,589	14,671
Calorific value, B.Th.U.	478·0	477·3
Therms per ton	64·95	70·02
P.ct. blue water gas	28·90	28·79

Dual Process of Gas Ppoduction.

In many works high yields of gas per unit of fuel are being obtained from the water gas plant, so that the great disadvantage of heavy labour charges usually levelled against horizontal retort practice is completely wiped out. The water gas plant working in conjunction with horizontal retorts has proved to be a very economic process. No other process of coal carbonization has so far proved as capable of producing results to satisfy the demands of present-day requirements. There are still great

possibilities ahead for horizontal retorts worked in conjunction with water gas plants.

Discussion.

Mr. R. FIFE (Kilmarnock), in thanking Mr. Scott for his paper asked if the water gas was metered before entering the foul main, and, if so, what effect it had on the meter? He also asked if Mr. Scott had had any experience with a portable calorimeter.

Mr. D. MELVIN (Uddingston) said that it was good to hear advocacy of horizontal retorts. In recent years Scotland seemed to be going the other way. In Uddingston all the coals were obtained from one colliery. They were constant throughout the year, the ash varying from about 3·5 to 4·5 p.ct. It was a good idea to cut-out coals with 10 to 15 p.ct. ash content. He asked Mr. Scott to give the make per ton of coal carbonized in the "through" retorts as compared with the make in the "stop end" retorts.

Mr. A. MACDONALD (Motherwell) said it was a pity that Mr. Scott had not given any figures for verticals. In examining coal, he had found great variations in ash. Some coals gave a white ash, but they were good for producers. Coals with brown ash had often given clinkering trouble.

Mr. A. TRAN (Helensburgh) did not agree with the author that horizontals were the most economic. He said it was possible to maintain any desired calorific value with verticals, and thought horizontals and blue water gas plant had no material advantage over vertical retorts.

Mr. SCOTT, in reply, explained that the water gas was not metered before entering the foul main. The gas was measured by taking the number of runs over a period, and measuring the holder. The figures for 1925-26 represented the old retorts, and the 1926-27 figures were for the through retorts. With regard to the variation of coals of different calorific value, he found the water gas beneficial here. With regard to the price into the holder, there was no great difference.

A vote of thanks to Mr. Scott, proposed by the PRESIDENT, brought the meeting to a close.

THE "UNSATURATED HYDROCARBONS" IN THE GASES FROM THE CARBONIZATION OF COAL.*

Reviewed by M. BARASH.

This, the latest technical report of work carried out at H.M. Fuel Research Station, is of an unusual type in that it is confined to a study of an individual constituent (or class of constituents) of coal gas. It represents an interesting and useful attempt to elucidate the composition of the more or less mysterious "C_nH_m" component, usually referred to as "unsaturated hydrocarbons" and sometimes as "illuminants." According to the convention of technical gas analysis, the "unsaturated hydrocarbons" are those which are absorbed by bromine or by concentrated sulphuric acid. Though present in only a comparatively small percentage by volume in coal gas (usually 2 to 3 p.ct. in high-temperature gases and 3 to 6 p.ct. in gases from low-temperature carbonization), the importance of these constituents may be judged from the example that the 2·5 p.ct. of unsaturated hydrocarbons in a gas of a calorific value of 500 B.Th.U. per c.ft. is responsible for about 60 B.Th.U., or from 10 to 12 p.ct. of the heating value.

The separation, purification, and analysis of these gases involves laborious and painstaking chemical processes, and the authors of this paper are to be congratulated on the successful addition they have made to the study of this subject.

In the introduction, mention is made of an interesting suggestion for the technical utilization of these gases. They may be recovered from commercial coal gas by condensation under pressure, and the product forms a valuable substitute for acetylene for welding and other purposes. Such information, taken in conjunction with recent suggestions such as those by Mr. T. Hardie in his address this month to the Western Junior Gas Association ("GAS JOURNAL," Feb. 15, 1928, p. 384), concerning the production of synthetic organic chemicals, indicates a promising field of research and development for the gas industry, particularly from the point of view of the possible utilization of otherwise idle carbonizing plant during low consumption periods.

The authors show these gases (after the removal of condensable products) to be composed essentially of the three olefines, ethylene, propylene, and butylene, with traces of amylene and other products such as butadiene and pentene.

Briefly, the method adopted for isolating and estimating these gases involves the preparation of their bromine compounds by washing measured quantities of coal gas with bromine. The resultant liquid is freed from excess of bromine, washed, and separated into three fractions by distillation under reduced pressure. From the first and second fractions, forming 90 p.ct. or more of the total, the ethylene, propylene, and butylene are liberated in a special apparatus by the action of a zinc-copper couple. The resulting gas is then analyzed by (*a*) absorption of the ethylene and propylene in 87 p.ct. sulphuric acid, and (*b*) combustion of a further quantity over heated copper oxide, and determination of the CO_2 produced.

In the comparatively small third fraction, or residue, the main constituent, butadiene tetrabromide, is determined by extraction with and crystallization from hot alcohol, and the butadiene is determined by calculation from the weight of the compound so obtained.

In describing results actually obtained, the authors have wisely taken a selection of gases produced from both high and low temperature carbonization of various coals. It was hoped that these would indicate some definite differences in the composition of the unsaturated hydrocarbons from the two types of process. It is evident that had such a result been obtained, remarkably useful developments might have been anticipated. The results, however, show the constituents to be remarkably similar in the two types of gas; the only difference being in the ratio between the quantities of the individual members present. The following results may be quoted as giving a rough indication of the yield and composition of the unsaturated hydrocarbons in typical high and low temperature gases:

—	Low-Temperature Gas.	Horizontal Retort Gas.	Vertical Retort Gas.
Combustion chamber temperature.	620° C.	1350° C.	1250° C.
C.V. of gas, B.Th.U. per c.ft. . .	710	564	479
Yield per ton of coal, c.ft. . . .	*circa* 5000	12,300	16,800
Ethylene content of gas, p.ct. . .	1·18	1·90	1·17
Propylene " " " . .	1·16	0·28	0·25
Butylene " " " . .	0·68	0·08	0·02
Butadiene " " " . .	0·15	0·02	0·02
Total	3·17	2·28	1·46
C_nH_m in gas (after oil scrubbing), p.ct.	3·4	2·4	1·7

The authors lay stress on the fact that these comparative figures show that a higher proportion of propylene is present in the gas from continuous vertical retorts as compared with horizontal retort gas, and that the amount of ethylene produced in both these systems is considerably greater than in the low-temperature gases obtained in their tests between 400° and 700° C. This is attributed to the cracking of hydrocarbons which takes place at elevated temperatures, and is shown to be more severe in horizontal retorts than in vertical retorts.

The paper begins and ends in the attractive manner which is now becoming a recognized and most useful feature of these publications—that is, with a concise summary of previous investigations on the subject, and a comprehensive bibliography of relevant publications.

* Department of Scientific and Industrial Research. Fuel Research, Technical Paper No. 19, by A. B. Manning, Ph.D., M.Sc., D.I.C., J. G. King, Ph.D., A.R.T.C., F.I.C., and F. S. Sinnatt, M.B.E., M.Sc., F.I.C. London: H.M. Stationery Office, 1928, pp. IV. + 19; price, 6d. net.

Gas Oil Prices.—The "Petroleum Times" reports that, as from Feb. 23, the price of gas oil has been reduced by ¼d. per gallon at all points, for all methods of delivery. Current prices: In rail-tank cars—*i.e.*, 10-ton lots at a time—4½d. per gallon; in smaller quantities of 1000 gallons and upwards, 4¾d. per gallon, net and naked, *ex* wharf.

The Business Efficiency Exhibition.—The Business Efficiency Exhibition, 1928, ended its run at the Holland Park Hall, W. 11, on Saturday last. Under the auspices of the Office Appliances Trades Association of Great Britain and Ireland, the Exhibition has been held annually since 1922; and comparison between this year's show and the first one staged demonstrated what a great advance in office methods and appliances has taken place in the last six years. The many efficient and easily handled adding and calculating machines indicated convincingly what an enormous amount of time is still wasted in some offices, where the installation of machines would enable those responsible for clerical work to occupy their time more profitably. While it is not our intention to describe the exhibits, readers will doubtless be interested in the Hammond "Varityper," which will write in every language, as well as in seventeen styles and sizes of type in English. The spacing between the letters can be varied instantly to suit the style of type being used.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Oils from Coal.

SIR,—Technical friends in Canada have lately sent me some official papers of the Department of Mines of the Dominion Government of Canada under the Hon. Charles Stewart, Minister of Mines, and Mr. Charles Camsell, Deputy Minister. These papers are the official reports of the Department to the Government, entitled "Investigations of Fuel and Fuel Testing," 1925, No. 671, and "Low-Temperature Carbonization of Bituminous Coals," by R. A. Strong, 1927, No. 671-3.

In view of the great interest in coal exploitation and the urgent necessity for an instructed technical opinion, these reports are well worth careful reading by those in charge of the technical aspects of the British coal industry. The general review of 1925 gives, as the opinion of Messrs. B. F. Haanel and R. E. Gilmore, the Technical Heads of the Department (which, it must be remembered, is the official Government body), that the neutral oils of coal distillation are suitable for the fractionation of oil products for ordinary commercial use; but it is to the close examination of Mr. R. A. Strong in his "Low-Temperature Carbonization of Bituminous Coals" that I would especially direct attention.

These investigations are expressly conducted in order to test the claims of various investigators on particular points. Part of the report (p. 19 *et seq.*) is devoted to an "Examination of the Neutral Oils." Here there is a most marked reference to an article appearing in your columns on June 16, 1926, entitled "Oils from Coal," by Mr. Harald Nielsen. Mr. R. A. Strong's concluding comment on neutral oils on p. 20 is as follows:

> It will be noted that the three coals gave neutral oils with quite uniform distillation ranges, the difference in the three curves being less than the usual difference noted with crude petroleum. This agrees with Nielsen's claim that all the neutral oils from bituminous coals are identical.

We find here, then, that independent research workers, advising one of our Dominion Governments and carrying on their investigations on Canadian coals with its full official authority, reach the identical conclusion of Mr. Harald Nielsen and his associates. Our decision has been arrived at after some years of continuous research on Canadian, British, Continental, and other coals. In contradistinction to the comments of the Fuel Research Board of the British Government, to whom Mr. Nielsen has directed various questions on this particular aspect of oil distilled from bituminous coal, without obtaining an answer, I note the language of this official Government body, expressed in the clearest terms.

The value commercially of such fractions of oils from bituminous coals was recently alluded to at the Institute of Fuel by the Chief Chemist of the Anglo-Persian Oil Company, and it has occasioned widespread interest at various technical congresses. It is most refreshing to find that the work of English coal scientists is being confirmed by a Dominion Government body approaching a similar solution—namely, the scientific exploitation of coal—by its own distinct methods.

BRYAN LAING,
Managing Director.
SENSIBLE HEAT DISTILLATION, LTD.

York Mansion,
Petty France, S.W. 1,
Feb. 21, 1928.

LEGAL INTELLIGENCE.

DUNDALK VALUATION APPEAL.

Waterworks Assessment.

At the Dundalk County Court recently, before Judge DOYLE, the Dundalk Urban Council appealed against the valuation placed upon their waterworks. The original valuation was £15 15s., and it was increased to £720.

Mr. A. A. DICKIE, K.C. (for the appellants), said that, so far as they could trace, the appeal was the first which was held in connection with the waterworks, and he urged that they were on a different footing from gas-works. They claimed that the valuation was made on an entirely wrong basis. The system which was adopted in this case was what was called the contractors' method. Such a method could not be applied to waterworks.

Mr. T. S. M'CANN, K.C. (for the Commissioners of Valuation), replying, urged that the profit-making basis was not the proper one in this case, where the waterworks, though they might not produce great revenue, were of wonderful value to the community.

His LORDSHIP said he had come to the conclusion that in the present case it would be impossible to arrive at a satisfactory assessment on the contractors' method. He made an Order discharging the valuation, and that the matter be remitted to the Commissioners of Valuation.

HEATHFIELD AND WALDRON GAS COMPANY.

In the Chancery Division on Friday, Feb. 24, before Mr. Justice CLAUSON, Mr. SWORDS, appearing on behalf of the debenture holders in the Heathfield and Waldron Gas Light and Coke Company, Ltd., asked for the appointment of a Receiver of that undertaking.

COUNSEL explained that there was considerable jeopardy that the inhabitants of the district would be deprived of their gas unless a Receiver was appointed. Money was due, he said, under a mortgage that was not enforceable at the present time, but interest for several months was due.

A Receiver had been in for some time for the mortgagees, and but for his action and efforts, the district would have had no gas, because the Company had practically no resources. Negotiations were proceeding, and there was a possibility of the debenture holders being paid out. There was also a judgment out against the Company, and he understood there was a threat of an execution. He understood the Company assented to the application.

His LORDSHIP appointed a Receiver and manager of the undertaking, who was not to act after June without consent of the Court.

On the same day, in the King's Bench Division, before Mr. Justice HORRIDGE, the case of the Southern Counties Electric Light and Power Supply Company, Ltd., *v.* the Heathfield and Waldron Gas Light and Coke Company, Ltd., was mentioned.

Appearing for the defendants, Mr. GORST announced that there would be judgment against his Company upon terms endorsed on Counsel's briefs. Mr. WALLINGTON (for the plaintiffs) asked for judgment for plaintiff Company for £242 10s., with costs; and his LORDSHIP entered judgment accordingly.

MISCELLANEOUS NEWS.

THE GASHOLDER ACCIDENT AT THE MANCHESTER GAS-WORKS.

Inquiry Concluded.

The Home Office Inquiry into the accident at the Bradford Road Gas-Works of the Manchester Corporation on Aug. 23 last, was resumed at the Manchester Town Hall on Thursday, Feb. 23, by Mr. FREDERICK O. STANFORD, O.B.E., A.M.Inst.C.E. The earlier proceedings were reported in the "JOURNAL" for Feb. 8.

The TOWN CLERK (Mr. P. M. Heath) represented the Gas Committee. Mr. C. S. SHAPLEY, Mr. WILKINSON, and Mr. W. J. SMITH (Bolton) were present representing the Institution of Gas Engineers.

The INSPECTOR said that when he adjourned the inquiry on the last occasion he mentioned that he intended to have further tests made of the ironwork. He himself selected samples which were sent by the Manager of the Bradford Road Gas-Works to the National Physical Laboratory. He had just received the reports, and would hand them to the Town Clerk. The Corporation Gas Engineer and Prof. Rhead could make any comparison or comment they thought fit. The samples previously tested were selected as average samples. He himself chose weak ones, and for that reason the figures might be expected to be somewhat lower. There were two reports from the Engineering Department and one from the Metallurgical Department. The Town Clerk had sent him a letter in which a Mr. Samuel Bidder suggested that ignition might have been caused by atmospheric electricity, but he had ascertained from the Meteorological Office that there was no thunder in the air in Manchester on the day of the accident. So the question of atmospheric electricity need not be pursued further.

The TOWN CLERK said he had received from Mr. Bidder another communication to the effect that atmospheric electricity could take place without any sign or noise of thunder whatever, and he was prepared to prove cases in support of his theory. Many people were under the impression that thunder must be heard, or otherwise recorded, if damage by lightning took place; but this was not essential. Atmospheric electricity was continually in operation during the major portion of the year, without causing any damage. Mr. Bidder was not present; but could be brought if his attendance was desired.

The INSPECTOR: Unless you wish to bring him forward, I do not think it necessary.

The TOWN CLERK said he was wondering whether some atmospheric electricity might have been in existence, but not in a form to cause the stations to report to the Meteorological Office.

The INSPECTOR: If you will let me have the letter, I will refer it to the Meteorological Office.

EVIDENCE OF ALDERMAN COOK.

Alderman *Tom Cook* stated that he had been a member of the Manchester City Council for 26 years, and a member of the Gas Committee 20 years. At present he was the Chairman, having held that position 16 months. Previously he was Chairman of the Sub-

Committee which was concerned with the Rochdale Road and Droylsden stations. At one time there was a Chief Engineer in the person of Mr. John Newbigging, who was responsible for the effective management of all the stations. Under him there were the acting station managers—one at each station—and under those managers the technical staff. After his death in 1916, his brother, Mr. William Newbigging, was appointed to the vacant place, and acted in the capacity of Advising Engineer—a part-time salaried officer. He resigned on his own initiative in 1925, and Mr. J. R. Hill, who up to that time had been the Manager at Bradford Road, was appointed Acting Engineer, subject to Mr. William Newbigging being retained as a Consultant.

The TOWN CLERK: Mr. J. R. Hill, in his capacity as Acting Engineer, had not also imposed upon him the separate duty of being a station engineer?—No.

He was relieved of all that?—Yes.

Since 1925 Mr. Newbigging had always been available to assist the Gas Committee when required, and he had been consulted on a great number of occasions. Mr. Hill retired under the superannuation scheme in September, 1927. There had recently been a proposal to appoint a Chief Engineer and Manager, but the policy of the Committee in relation to that proposed appointment had changed, and at the present time the Committee were reviewing their whole policy as regards management. They were under an obligation to present a report to the City Council in the near future. The present practice was that the Managers were called together to meet himself and the Secretary of the Committee. They made reports; and if the occasion warranted his going down to the works, he did so. At one time it was intended to make it a weekly meeting, but circumstances had interfered with that arrangement. On Aug. 23, Mr. Newbigging was sent for, but not by witness.

The TOWN CLERK: Mr. Newbigging's relations with the Committee are such that if anything of importance affecting the Gas Committee and its undertaking occurs, he does not wait to be invited. He is one of those good-natured people who are always anxious to assist; and he comes along. I should imagine in this case that, hearing of the accident, he at once proceeded to the works.

Witness explained that the Managers made verbal reports, and also sent in written statements of their requirements. These were discussed at the meetings of the Committee, and sometimes relegated to Mr. Newbigging as Consultant. The Managers attended meetings of the Sub-Committee, but not the general meetings. Mr. Newbigging was not paid a retaining fee or a salary, but he was engaged on a commission basis on new work, and of course would be paid in respect of anything he reported upon. He was in entire charge of the new works at Partington. On Aug. 23, witness received a message about the accident, and he and the Secretary went to the works immediately. They stayed until it was thought all danger was past. Mr. Newbigging was there, and witness told him a special meeting of the Committee would be immediately called, and they would want his report. It was not considered necessary to get a report from the Manager, nor was there one from Mr. Hill, the Acting Engineer.

The INSPECTOR: It was left to Mr. Newbigging?—Yes.

As to maintenance, had the Committee been cutting down expenditure on that in the last few years?—Not at all.

Have they been refusing any requests by the Managers?—Not since I have been in charge. Nothing of that kind has taken place.

Anything that the Managers have reported to be necessary, have you satisfied them about it?—Perfectly. If it has been essential, it has been carried out.

You did not call in any outside expert apart from Mr. Newbigging to consult with him or anything of that sort?—No.

Did Mr. Hill ever report to you that there was any objection to the continued working of these four holders?—No. Some repairs have been carried out by Messrs. Dempster.

He never reported to you that the holders should be thrown out of use, or that they were dangerous to use?—No. These repairs having been carried out, it was assumed that everything was safe.

The TOWN CLERK remarked that the repairs in question were done under Mr. Newbigging's supervision, and upon his specification, though Mr. Hill was the Acting Engineer at the time.

THE COUNCIL'S ADVERTISEMENT FOR AN ENGINEER AND MANAGER.

Questioned as to when the remaining holders were put out of commission, witness said that until they were assured danger might arise, the Committee thought they were justified in using them; but after receiving Mr. Newbigging's report, dated Jan. 4, that it would hardly be safe to continue employing them, they were put out of commission immediately—on Jan. 6. The advertisement for a Chief Engineer did not arise out of the accident. The view of the Committee was that the increased capacity of the works, taking into account the part which would be coming into use shortly, would ultimately require a manager and an engineer, two separate individuals. The Council took a different view.

The TOWN CLERK: The desire of the Committee was to appoint a manager. To that appointment the Council attached the office of engineer—a general engineer and general manager. That was the instruction to the Committee, who made some effort to carry it out, and they ultimately presented a report to the Council asking them to rescind that resolution, and they would report further. It is no secret in Manchester, and there is no reason why the information should not be communicated to you. The Committee came to the conclusion that none of the gentlemen who applied for the appointment was suitable, and they so reported to the Council. They are now under an obligation to bring up another report on the subject; and I understand they are looking at it now from the point of view of a manager, excluding the question of a person having engineering qualifications also.

The INSPECTOR: Are your Committee perfectly satisfied as to the safety of the remainder of the works?—I think so.

This is an unexpected accident?—Quite unexpected.

Have you taken any steps to have an investigation or inspection of your works to see whether there are any other weak spots?—Such a thing is hardly necessary, because the works have been recast under the direction of Mr. Newbigging. Practically, the works may be said to be almost entirely new.

The Bradford Road Works?—Yes.

How long ago were they re-cast?—From 1917 to 1925.

There is no question of any other fault being found?—I think not.

The INSPECTOR said there was one point in his investigations about which he had not been able to satisfy himself entirely. When the ironwork of holders Nos. 1 and 4 was taken out of the tanks, he wished the operation to be done carefully, and that such things as inner rollers and their guides be inspected to see what evidence could be found.

The TOWN CLERK: That shall be done. Any other request you make in that direction will be carried out.

Mr. *William Newbigging* said the practice was for the Manager of each station to prepare a statement annually, in which certain maintenance work was recommended to be carried out during the year. Up to the time of his resignation in 1925, those reports were referred to him; after that date they would be referred to the Acting Engineer, Mr. Hill. There were also intermediate requests for maintenance. Practically, on the occasion of every visit of the Engineer to the works questions in regard to maintenance would be discussed. The new works at Partington he visited weekly or fortnightly. So far as other works were concerned, since 1925 he had rarely visited them. Any demands by the Managers would be made to the Acting Engineer up to last September, when Mr. Hill resigned.

The INSPECTOR: Apparently there is a hiatus at the present time; the Acting Engineer having resigned, and nobody having been appointed in his place. In the meantime, the Chairman of the Gas Committee and the Secretary are carrying on and referring to you in any difficulty?

Witness: Yes.

Mr. *A. L. Holton* (the Manager at Bradford Road) was again called. He stated that, owing to settlement of the ground, there were slight differences in level; and when a lift came down, it would settle slightly out of level. There would be a slight wobble every time a lift was picked-up or dropped. The four holders had never been emptied since they were built, until after the accident; and then they were pumped out.

The INSPECTOR: No one inspected the inside of the tanks until after this accident?

Witness: No.

The INSPECTOR said he wanted some information as to the condition of the inside rollers and their guides; and he would ask Mr. Holton to inspect them as they were got at, to see whether the rollers were fast, or whether there was any indication that they had got off their guides or fouled at any point so as to interfere with the working of the whole. Had witness any suspicion that anything of that kind might be the cause of the holder being out of level?

Witness: I have not, for this reason: The guide rails of that outer lift are fairly well in view now in a large number of cases; and there is no evidence of their being fouled in any way. But we shall get a better view when we come to cut the side sheets down. We can make a plain drawing of sides similar to what I have given of the top. We will calibrate the rollers.

The INSPECTOR said that what he wanted to be clear about was whether there was any possibility that the holder was jammed. Assuming it stuck temporarily, the safety valve was the water seal.

Witness replied that the holders had never been known to give trouble by sticking or jamming. The pressure on the record sheets would reveal this at once if the holder was in use; if it was not in use, it would be revealed on the water seal.

The INSPECTOR: That is now 24 in.?—Yes.

So that the pressure might increase to 24 in. before it would blow? It could only go to 24 in. It was designed for 18 in.; and by putting this other 6 in. on, the effect would be to load the safety valve.

Witness replied that the design would hardly be for the 18 in. seal. In those days they had pressures on the system generally. Now it would always be taken at 24 in.

The INSPECTOR: By adding another 6 in., you have loaded the safety valve to that extent?

Witness: If you look at it as a safety valve, yes. We should not assume it to be a safety valve except that it would act in the way you say, and it is now 24 in. instead of 18 in. Witness added that he had not taken out what the pressure would be of the 24 in. water seal against the holder. He would not expect it to burst. Even if there was the pressure of 24 in. inside, he would expect the holder to be all right. He had always thought the gas took fire at a distance, but at what exact point he could not say. From the appearance of the sheeting, he formed the opinion that the crown framing of No. 4 holder was depressed, and burst the crown curb.

The INSPECTOR: Why should it be depressed?—From what I know now, because of its weight, and the fact that the crown was not trussed.

That is Mr. Newbigging's point?—Yes.

SEAL DEPTH.

Mr. *Newbigging* was recalled, and said he had conferred with Prof. Rhead regarding the reports from the National Physical Laboratory. There were divergencies from his own report on stresses and strains, and Prof. Rhead's report as to the metallurgical tests; but they were only such as one would expect from the fact that the figures related to different samples. There was no obvious discrepancy. Generally the reports confirmed each other. Prof. Rhead stated in his report that there were no exceptional signs of corrosion of the plates. The samples sent to the Laboratory were somewhat corroded.

The INSPECTOR: Would corrosive action be likely to occur subsequent to Aug. 23 by reason of exposure to the atmosphere?

Witness: Yes. They were lying about there for some months, and naturally a certain amount of what I would term surface corrosion would set in.

The INSPECTOR said he wished to ask a question regarding the point that the lute would not blow under about 24 in. Had witness made any calculations as to what the stress on that ironwork would be?

Witness replied that he had not. As a matter of fact, it would only be the natural pressure of the gas inside the holder, assuming the holder was working freely.

Assume, for the sake of argument, there was some binding for a short period. It might rise up as high as the 24 in.?—Yes.

When you put on that additional 6 in., did you realize that it was loading the safety valve of the holder?—Yes, we realized that.

But you thought it was perfectly safe?—Perfectly safe. As a matter of fact, if the Corporation build another holder at Bradford Road I shall strongly recommend them to put a much deeper seal than is usual—not less than 24 in. That is a matter for consideration. Then, in the event of any subsidence—any tilting of the holder—we have a greater degree of safety in the deeper seal.

The INSPECTOR said they had got to find, if possible, an explanation of why the gas escaped from the holder. One possibility was the holder might have stuck, causing excessive pressure inside. No. 4 had got the sun on it.

Witness: I do not think there is anything in that. There was not any exceptional amount of sunshine to cause that holder to lift. Supposing it did lift, the gas would simply bubble out at the bottom and escape.

The TOWN CLERK: To what extent would it lift up?

Witness replied that it depended on the amount of sunshine. He had often seen a holder lift three or four sheets—say, 6 or 7 ft. This was allowed for in planning a holder. In this case the holder was fully filled except for a margin of half a sheet—say, 18 in. They could have put another half sheet in without having any blowing of the gas.

The INSPECTOR: If the holder jammed, and it could not lift that half sheet, the pressure would increase inside, and something would go? The gas would have bubbled out at one of these intermediate cups, or else something would have to go?—Yes, I agree that it would have bubbled out here.

The INSPECTOR said that no one had suggested a better reason. This was why he was anxious to know if there was any indication that the holder had become fixed.

Witness: I think it would have shown itself on the guide rails. I looked at the guide rails very closely after the accident, and I did not see any signs of binding.

The INSPECTOR: Which guide rails are you referring to? The guide rails of the columns, the outside ones?—Yes.

What I have in mind is the inside ones under water.—Those we have not plumbed.

Those have never been seen since they were put in 30 or 40 years ago. They have been under water all the time?—Yes. As soon as we can get this ironwork out, we propose to plumb the tank.

Would you agree with me, without making any very careful calculations, that if such a state of things occurred before it blew the 24 in. seal out of those cups, it would have burst the crown sheeting?

Witness said he would not agree to that statement without making calculations. He would calculate the pressure on the 24 in. seal and the bursting strength of the crown plating. But he assured the Inspector there was nothing in it. Even having regard to the corroded state of the sheeting, it would not burst at 24 in. The pressure would only amount to a few pounds.

The INSPECTOR: When you make your calculations for a holder in ordinary practice, you make them on the pressure which the holder has under working conditions? You do not make it on the basis of the amount of seal. If a sheeting is designed for 11 in., and this is 24 in., it is more than double.

The INSPECTOR said he received a letter from the Secretary of the Institution of Gas Engineers stating that Mr. Shapley would attend the inquiry for the purpose of affording assistance regarding any points which might arise on the evidence. On Feb. 6 he wrote to Mr. Shapley that the matter was of considerable interest to the gas industry generally, especially in view of the statement that a large number of holders of similar age were still in use. He was therefore anxious to obtain the fullest possible information on the subject; and in view of Mr. Shapley's knowledge and experience it would be of great value if he would give the benefit of his opinions, more particularly in respect of—

(*a*) any similar or comparable occurrence;
(*b*) the practice of the industry generally with regard to the maintenance, and strengthening and life, of such holders; and
(*c*) any external cause which may give rise to the initial escape of gas.

He would be glad to hear any statement Mr. Shapley wished to make.

MR. SHAPLEY'S VIEWS.

Mr. *Shapley* said it was impossible to answer those questions before consulting the Council of the Institution. The Council had considered the letter, and had formed a Committee to go into the question of gasholders, and they asked Mr. Wilkinson (Nottingham) and Mr. Smith (Bolton) to accompany him for the purpose of assisting the Inspector in regard to any information he required. They were indebted to the Chairman and the staff of the Manchester Gas Department for the facilities granted to them when they visited the works on the previous afternoon. There was no attempt to hide anything; and they were able to inspect the inside of the holder. From the inspection he thought it was safe to say the industry had not experienced any similar or comparable occurrence. The Press had referred to the accident as an explosion, but they were satisfied that the holder did not explode; it caught fire.

In recent years the question of gasholder repairs had been receiving very much more attention than it did in the old days. He could not go back beyond about 22 years, but he could claim to have had an extensive experience of gasholders. There were sixteen under his immediate notice at present, and he had no reason to suppose the practice adopted in Leeds was different from that adopted in other cities. During the last eight years they had spent in Leeds £31,000 on gasholder repairs. That did not include painting. It included examination of rollers, renewals of bad plates, and, in some cases, complete renewals of the inner lifts of small holders. When he was President of the Manchester Institution he read a paper on gasholder repairs, which created some interest, and he thought that since that day there had been evidence of greater attention being given to gasholders. They were not sure what exactly was meant by the reference to any external cause which might have given rise to the initial escape of gas.

The INSPECTOR: I wanted to know how the gas got out of the holder before it caught fire. I have heard a good deal of evidence about it since.

Mr. *Shapley* said they thought it meant any external cause which might give rise to leakage of gas from any holder. After the evidence which had been given, he agreed with Mr. Newbigging that, so far as one could ascertain from a cursory examination, the accident was due to the collapse of the trussed roofing. This threw a strain on the outer circumference of the holder, about three sheets down, which it was never constructed to stand, causing a ripping. It was not only in the roof; it tended to increase the diameter of the holder, and ripped the top plates off in two places. The holder settled somewhat quickly, and in his opinion caused the crumpling and throwing back of the plates on the top of the holder. When he and his friends examined the sheets as they lay on the ground, they were struck by the extraordinarily good condition. He heard with interest Prof. Dixon's evidence, and was surprised at the amount of lamination present in these sheets. Nobody could have foreseen it, because the external condition appeared so excellent. Internally, of course, the plates showed fatigue.

The INSPECTOR invited observations from any member of the public who wished to express any views. There was no response.

The TOWN CLERK said he could not let the inquiry conclude without tendering to the Inspector the sincere thanks of the Corporation for the careful and able manner in which the inquiry had been conducted. However uncertain the exact cause of this accident might be, he hoped it had been made clear that the predecessors of the Gas Committee in 1878 acted with proper prudence and caution and under competent advice, that the contractor did his duty, and that subsequently the Corporation maintained the works to the best of their ability and in accordance with good engineering practice. It appeared clear from Mr. Shapley's independent judgment that, so far as the eye could discern, the works were in excellent order.

The INSPECTOR thanked the Corporation and their officials for the help given to him, and closed the inquiry.

New Company.—There has been registered as a private Company, the Internal Heating Company, Ltd., to acquire inventions relating to internal heating and to low-temperature carbonization of coal, &c. The nominal capital is £1000 in £1 shares.

Price of Gas Reduced at Hornsey.—The Hornsey Gas Company announce a retrospective reduction in the price of gas from 9d. per therm to 8d., from the date of the reading of the meters for the Christmas quarter, 1927. This reduction is equivalent to 5d. per 1000 c.ft.

Gas at Bradford Ideal Homes Exhibition.—At an Ideal Homes Exhibition opened at the Belle Vue Drill Hall, Bradford, yesterday, for ten days, the Bradford Corporation Gas Department have an attractive stand showing various makes of fires, cookers, geysers, and practically all other domestic gas appliances. The Department are also running a competition for bread baking, and another for cake making by gas; valuable gas cookers and money prizes being given.

Price Reduction at South Shields.—The Directors of the South Shields Gas Company intimate that the price of gas will be reduced by ½d. per therm, making the price 9½d. per therm for the inside area consumption, and 10·3d. per therm for supplies in the Company's outside area districts, both to take effect after the current March quarter meter readings. A relative additional rebate will also be given to prepayment consumers as from the collections commencing on April 1.

Lectures at Leamington.—The last two technical lectures at the Central Showrooms of the Leamington Priors Gas Company were delivered on Jan. 16 and Feb. 20 by Mr. George Sawyer, of Messrs. William Sugg & Co., Ltd., and Mr. S. Algar, Deputy Borough Engineer and Surveyor of Leamington. Mr. Sawyer dealt with gas lighting generally, explaining the principles of the bunsen burner and the gradual development of modern incandescent lighting. He also explained the construction and operation of Sugg's distant control system by means of models, and proved successfully the great economy of gas lighting over other methods. Mr. Algar gave an interesting report on the recent reconstruction work in that part of the Pump Rooms which is devoted to medical bath treatment, dealing with the matter from an engineering point of view. During the course of the paper and its discussion, it was pointed out that burning of coal in open fireplaces had been done away with, and that the whole establishment, including the Turkish baths, are heated throughout with gas coke, which is also used for firing two new water-tube boilers. The lectures were well attended by the employees of the Leamington and neighbouring gas undertakings, as well as by local gentlemen interested in the gas industry and the Pump Rooms.

SOUTH METROPOLITAN GAS COMPANY.

ORDINARY AND EXTRAORDINARY GENERAL MEETINGS.

The Ordinary General Meeting of the Proprietors of the Company was held at the Cannon Street Hotel, E.C., last Wednesday—Dr. CHARLES CARPENTER, M.Inst.C.E., in the chair.

The SECRETARY and ACCOUNTANT (Mr. Frank Day) read the advertisement convening the meeting, and the minutes of the last ordinary general and extraordinary meetings. Thereafter the seal of the Company was affixed to the Register of Proprietors.

THE ADDRESS OF THE PRESIDENT.

The PRESIDENT, on rising to address the meeting, said: Ladies and Gentlemen,—Your usual practice has been to take as read the report and accounts; and presuming you do not desire to change this method, we will proceed at once to their consideration. We are, as you are aware, chemical manufacturers upon a large scale; our all-important product being gas, and our main business that of selling it, which we do in keen competition with the suppliers of other forms of energy. Notwithstanding this, we have not only maintained our output, but we have increased its amount during the past year—not, it is true, in the same proportion as has been the case with some of our suburban neighbours, but sufficiently on the right side to indicate progress. Climatic conditions were not of the best kind for gas companies last year; the summer being damp, and the winter relatively mild. If we have a hot summer, people turn to their gas cookers; if it is a damp and cold one, people keep their coal stoves going longer than is otherwise the case. On our busiest day last year we exceeded our previous maximum gas production by 7·7 p.ct. The occasion was one cold day last December; and this will enable you to form a picture of the amount of plant which has to be installed and ready for use on those special and extraordinary occasions.

MORE CONSUMERS—AND BROAD-MINDED LANDLORDS.

The report goes on to tell you that, by some 4400, we have added to the number of our consumers, many of whom live in the new housing estates being developed by the London County Council. I am pleased to be able to add that most of our new consumers are all-gas ones, and the reason is because they prefer it. Being mostly engaged in commerce and industry, they like a rapidly prepared cup of tea in the early morning, and a light by night that does not try their eyes for working or reading; and nothing fulfils their requirements so well as gas. In this respect, our experience has shown that the London County Council are broad-minded landlords, and accept the Englishman's birthright that his home is his castle, in which he is free to use what conveniences he pleases, even although he may pay a weekly rental for his rights. It is impossible to imagine that a clause would be inserted by that Council in his tenancy agreement binding him never to use a 'bus to travel to and from his work, or to ride on anything else than a tramway, because the cars belonged to the same landlord as his house. If such regulations were made, a very poor justification for the tramway system would be thereby implied. Indeed one fine day we might expect to find that even the use of "Shanks's pony" was prohibited, because the profits of the tramway undertaking were being thereby interfered with. Fortunately, as I have said, the Council for the County have consented to their property being piped for gas or wired for electricity—or, indeed, fitted-up for using both forms of energy, leaving it to the tenant to take whichever he pleases. But every Borough Council is not so fair-minded—and, indeed, just—as the parent authority. I have in mind one which pulled-out the majority of the gas-lights from their streets, and put in electric lamps instead. Why, you will ask? Not because they were either cheaper or better, but because more work was thereby found for the municipal undertaking's employees, even though this entailed loss to a very old-established ratepayer. I should not complain if the service given were better. However, I am glad to say that the public gas lamps in South London continue to increase from year to year; and as regards efficiency the public is able to judge for itself.

STANDARDIZED APPLIANCES.

I have upon previous occasions drawn attention to the fact that we maintain a considerable staff for the purpose of research, and its work pertains to gas-using apparatus as to other departments of our undertaking. In fact, during the last twenty-five years or so, the consumer has relied upon us not only to recommend, but, in many instances, to design and produce, the appliances best suited to his requirements. But as these are nearly all hired, we have to maintain them in an efficient condition; and the problem of interchangeability of parts, in cases of damage by wear and tear or misuse, becomes a very important one. I am glad to say we have made good progress in this direction, and are able to furnish highly efficient appliances which are ready to fix, and go to work, without having to be tuned-up on the spot to suit any particular consumer's circumstances. We are not only making our cooking stoves more efficient (and, in a trial between a standard type of cooker and an electrically operated one, we came out the winner), but more convenient also. Owing to the large capital expenditure involved, such changes have to be made carefully and deliberately, or evolution in design might involve greater, instead of less, expenditure in the long run on the part of the user.

EXTERIOR SHOP LIGHTING.

The use of high-power gas lighting continues to extend in the chief business centres of South London. The shopkeepers are, in my opinion, more alert and critical than their brothers in the West End, for they have discovered that, instead of lighting their shops from within, and disregarding the side-walks, the more successful method is to attract customers by the illumination of the pavements alongside which the shops are placed, and thereby to light up the goods displayed in their windows—or, in other words, to attract the public, firstly, to the shopping area, and, secondly, to the shops. The proportion of the maximum daily consumption to the average daily consumption throughout the year plays an important part in our working costs. Our maximum last year was one two-hundred-and-twenty-sixth part of the whole. The ideal would, of course, be one three-hundred-and-sixty-fifth. And here the industrial load comes in very helpfully—one industry alone consuming, in different undertakings, as much gas as an entire town the size of (say) Chelmsford or Great Yarmouth.

FURNISHING ACCOUNTS AT MORE FREQUENT INTERVALS.

While on the subject of gas sales, I must tell you of an important change in our accounting system which we have been for some time past busily engaged in preparing. References were made in the London Press some time ago to the desirability, in the gas consumers' interests, of furnishing their accounts at more frequent intervals than once a quarter. The desirability of adopting the suggestion appealed to us forcibly, for, with the present system, the ordinary consumer of gas goes on burning it throughout (say) the cold period of the year, without realizing how much he is using or what debt he is incurring. He forgets, when he gets his bill in April, after the fine spring days have started to come upon us, of all the use he has made of his gas supply during the cold months of January and February. Now, a dissatisfied consumer is the last thing we want. We would rather a user of gas burn a small quantity cheerfully than a larger one complainingly. Most salaries that are not paid weekly nowadays are paid monthly; and the new method will enable the householder to keep as careful a check upon the costs of his gas as he does upon his food or his fuel. I am glad to be able to add that two of the great London Banks are co-operating with us by placing their banking facilities at our disposal for the collection of our accounts; and I should like publicly to acknowledge the sympathetic manner in which these large organizations responded to our overtures for their co-operation.

HEALTH VALUE OF FLAME.

You will be interested to hear of what promises to be an important investigation in which our officials, in conjunction with the Institution of Gas Engineers, have been taking part, in the determination of the penetration into the human skin of various forms of light and heat radiation—thereby enabling us to form some conception of what is meant by the term "comfortable heat." The work has been carried out under the direction of Sir Henry Gauvain, the Medical Superintendent of Treloar's Cripple Homes, at Alton, Hampshire. We have there erected an installation for producing this "comfortable heat," which is used as an integral part of the radio-therapeutic treatment of tuberculous patients, and in which they are flooded, so to speak, with heat rays derived from gas, burning on the surfaces of radiating materials. We are but on the fringe of these interesting problems, and much remains to be done. There is still a great deal to be learned with regard to the properties of flames and the nature of the radiation they emit when burning in contact with various substances. We must wish this particular experiment all success; but, however it may turn out, there is no doubt that the last word has not yet been said of the health value of flame. It is, indeed, not unlikely that, in the case of the great luminary which heats and lights our earth, we probably depend at least as much upon the thermal radiation from his incandescent gas as on other components of his radiant energy.

QUESTION OF COKE.

I have been speaking so much about gas, that it is time I turned to another of the products of our coal distillation—namely, coke. Coke has been in the past somewhat of a neglected product. There has been a tendency to concentrate upon gas technology, to the disadvantage of coke. I think it has suffered from having been called a bye-product—something of a by-word—when it deserves its status as a product, just as much as gas itself does. But we have made a good start towards correcting this inequality. There is no doubt we ought to produce coke of a uniform quality throughout the year; and if with the same care we grade it as regards size, we shall satisfy our consumers' needs considerably more than is now the case. Our obligation with regard to the uniformity of gas is easily understandable; but I am afraid there have been times when the coke quality has been sacrificed to the exigencies of gas production. I think we have to correct this error—as I regard it—in our technical methods. Although we do not use any ourselves for the purpose, a good deal of coke is still required in the gas industry for the production of water gas—formerly used as an enricher, and more recently as a diluent. For all gas-works purposes the poorer grades should be utilized. We welcome the endeavours of the London County Council to put the sale of coke on a basis nearer to that of coal. It should certainly be sold only by weight, and, further, it is unarguable that wetness is an undesirable quality.

A COKE GRATE WITH GAS LIGHTING BURNER.

We have now placed on the market a domestic grate suitable for burning coke, which can be fitted to practically every fireplace. Instead of using paper and sticks of wood, a small gas burner is substituted, which provides at no greater cost the means of lighting the fuel. It has the advantage that the starting of a coke fire entails scarcely more trouble than the turning-on of a tap. The design of the grate is such that, once lighted, the fire goes on without attention until it is either replenished or allowed to burn out. The lighting-up of domestic fires is one of the causes of smoke in our large cities. You can see this for yourselves any morning in London or any other city—and for that matter, in villages too. And in cases where solid

fuel is preferred to gaseous the use of a gas burner for its ignition saves labour and avoids nuisance.

LOW-TEMPERATURE CARBONIZATION.

Speaking of solid fuel reminds me to say a word about what is called low-temperature carbonizing. We have carefully watched its development for over twenty years—since, in fact, the most advertised variety first fascinated the investing public and invited encouragement from their pockets. There is no doubt that, in the general interests of the community, every ton of coal used in our large cities should pass through its gas-works gates; but whether it is to be first submitted to high temperature or to low temperature remains yet to be proved. Two fundamental points have to be considered: First, the adaptability of the process to the stringent conditions pertaining to the supply of gas; and, secondly, the likelihood of the solid product being regarded favourably, more particularly as to the cost, by the public. These questions can only be satisfactorily answered by the behaviour of plant erected on a sufficiently large scale. If the negotiations are successful, we propose associating ourselves with the installation at our East Greenwich Works of a process which favourably impressed the Board and our Managers. You will understand that, whatever plant is installed, the continuity and regularity of gas production by the distillation of coal therein cannot be for a moment jeopardized.

TAR AND AMMONIA.

As the report informs you, the revenue from tar, like that from coke, has fulfilled our expectations. After boom periods, such as that through which we have lately passed, we have to be careful that selling prices both of tar and tar products are promptly readjusted to changed and changing economic conditions. Even if we had any desire to do otherwise, we should be promptly brought to our senses by the fact that dependent industries—dependent, that is to say, on tar products—are all the time on the look-out for lower-priced substitutes; and I believe it is an unsound policy in many cases to take advantage of a temporary shortage or demand to unduly raise prices. At any rate, our records can show some examples of the results of such practices.

As regards ammonia, in spite of the heavy fall in the value of sulphate, our receipts from the product have not fallen in proportion to its lower market price, and it still returns an important proportion of our revenue. This result has been attained by changes in our manufacturing as well as our selling methods, which have together been responsible for the favourable results.

COAL CLEANING.

The cost of our raw material, coal, has been heavy—nearly one-and three-quarter million pounds. Although the great coal strike was officially over at the beginning of December, 1926, we had to go on taking high-priced foreign supplies until the beginning of February last year. During the last twelvemonth now under review we have obtained the highest gaseous yield of any period in our history, partly by the better working of our plants, and partly by reason of our efforts for the reduction of ash and impurities in the coal. I think I told you on one occasion that the amount of dirt and ash in the coal was sufficient in quantity to employ one collier to bring it from the North down to the Thames. Progress in this respect is very desirable; and at least three plants for de-ashing without the use of water have been installed at certain collieries, while I understand several others are on order. There are both wet processes and dry ones for de-ashing coal. One of the disadvantages of wet processes—which otherwise do their work very efficiently—is that you have to get rid afterwards of the surplus water. Endeavours have been made to utilize the heat from some of the inferior coal and slack for the purpose of drying the coal; but it is not very satisfactory, and if the dry process can be commercially worked, a great step forward in the cleaning of coal will have been achieved.

I must take this opportunity to congratulate the mine-owners upon their forward policy in this respect, which might not have been adopted so rapidly had it not been for the gentle pressure and friendly help furnished by our keenly-interested staff in Newcastle, under our representative there, Major F. J. Bywater. Every freight of coal bought on our account is sampled and analyzed; and we are thus enabled to keep a close control over our carbonizing work in London. I wish I could speak as highly of the facilities provided for shipment in the North. In most cases these leave much to be desired, if not in design, then in working. We should certainly be able to work our steam colliers to better advantage, if a systematic overhaul were made, not only of the staithes, but of the rail tracks connecting these with the mines, together with the provision of adequate rolling stock.

The agreement with our neighbours, the South Suburban Company, which you authorized at our last meeting was, after being approved by the Board of Trade, duly entered into.

DIVISION OF PROFITS.

The dividend your Board propose for the year is at the rate of 6½ p.ct. You will remember that this is made up, as regards 5 p.ct., by the basic rate authorized by Parliament, and as regards the balance by a share of the available surplus profits. Of these surplus profits, three-fourths go to the gas consumers by way of reduced charges for gas. The remaining one-fourth is divided equally between capital and labour—the co-partner shareholder and the co-partner employee. I think you must have been interested—as, indeed, I was myself—with two manifestoes which have lately been projected, so to speak, into the atmosphere which pervades and envelops our daily existence. One would, I suppose, be called political in its origin, and the other industrial; but their resemblance is very curious and striking, and they must, I think, be taken as a remarkable sign of the times. Ladies and gentlemen, I need not remind you that for nearly forty years you have shared, not only the anxieties, but the profits of your business with your employees. And during that period they have been not only employees but shareholders like yourselves. For many years also they have shared the responsibilities of management by electing Directors to this Board, as you do yourselves. In those years we have not only enjoyed industrial peace, but industrial help likewise from the great mass of our employees. If no great fortune can be made to-day in the gas industry, it has, on the other hand, brought good fortune to many thousands of workers therein; and among all industries it has furnished the finest example of co-partnership between capital and labour, which time only serves to strengthen.

I could give you many examples of this. The first will easily appeal to all of you. You will remember the disastrous flood which took place in the Metropolis early last month. Fortunately, none of our works sustained damage, and there was but little inconvenience; and we were happily able to maintain a full supply of gas during the occurrence, although many areas were flooded. Indeed, though little publicity was given to the fact, very great distress was occasioned in some of the poorer areas of South London. You will be interested to hear that, apart from the contribution of the Company, our employees alone collected voluntarily among themselves no less an amount for the relief of the distress than £118. As another example, I will give you that of industrial accidents. I was struck the other day by a remarkable appeal addressed by the Home Secretary, Sir William Joynson-Hicks, to the Industrial Welfare Society in the matter of industrial accidents. We had an extraordinary experience in regard to this matter soon after 1914, when so many of our co-partners joined the Colours. In a comparatively short time our accidents more than doubled. Now, this was not due to badly designed or inefficient plant, but to the greater carelessness and want of experience on the part of our temporary employees. It has taken a long time to get straight again; but I am glad to say we are now down below pre-war figures. The most potent factor in bringing about this reduction has undoubtedly been the holding of inquiries into all accidents which necessitate absence from work, as well as such others as may have had serious characteristics. Juries of twelve workmen, provided in rota from a panel, and in which various departments are represented, examine witnesses, discuss in private, and return verdicts and make recommendations. The system has worked admirably for a great many years, and if generally adopted would, in my opinion, achieve more useful results than could be possibly obtained even by a large army of inspectors under an Act of Parliament. Theoretically, it should be possible to eliminate all accidents; in practice, it is impossible. One has only to compare the number of street accidents with factory accidents to realize how true it is that individual carelessness claims most victims. We get many useful suggestions from our employees for reducing risk to life and limb; but though the co-partnership spirit is responible for much of the good work we have been able to perform, it will be a bad day for co-partnership if it is ever made compulsory instead of voluntary.

THE PROSPECTS.

In conclusion, ladies and gentlemen, you may put the vital question to me: "What are the prospects of our undertaking?" I think they are perfectly healthy. There is one point particularly to bear in mind. This is that nowhere in the world has gas supply been developed with the same skill and to the same extent as in Great Britain, where one company alone distributes as much energy as all the power stations and super-stations together, from John o' Groats to Land's End. I beg now to move:

> "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The VICE-PRESIDENT (Mr. Frank H. Jones): Dr. Carpenter's annual reviews at these meetings on the condition and position of this Company and the gas industry at large are always very interesting; but I venture to say that the address to which we have just listened has been more interesting than ever. I do not propose to mar the speech by doing more than second the resolution for the adoption of the report and accounts.

Mr. WOOD: The accounts show excellent results; but there are one or two items to which I should like briefly to refer. In miscellaneous charges, superannuation, sick, and accident funds, national health insurance, and unemployment insurance are about half what they were last year. Then in the balance-sheet there is a large temporary loan. Lastly, is not the reserve fund rather small?

The PRESIDENT: If no one else desires to speak, I will answer the questions that have been put. With regard to the reserve fund, I am not sure how far the suggested proposal—if I might call it so—would be acceptable; for I must remind you that the reserve fund can only be built up by foregoing a portion of dividend. In no other way can it be done. It must be from money that is available for dividend. As to the amount of the reserve fund, while we should like to see it higher (and as recently as the year before last we made a substantial addition to it), I am inclined to think the present allocation of available surplus profit—that is, by increasing our dividend to 6¾ p.ct.—is really doing something which is more justifiable, and which, having regard to the history of gas dividends for the last dozen years or so, is more just than would be at this juncture an increase in our reserve fund. [Applause.] Now with regard to the temporary loan. At the last Board meeting, it was reported that there was no temporary loan. The object of a temporary loan is, of course, to obviate the raising of capital which would require the payment of dividend on it for all time. The advantage of a bank loan is thus obvious. With regard to the amounts allocated to the superannuation, sick, and accident funds, as a matter of fact these are increasing yearly. Our obligations in respect of superannuation, sickness, and general welfare are not getting less, but greater; and we ourselves are responsible for some of the additions, because as far as possible we want our employees put in the position of being able to give us, not a year's work interrupted from time to time by sickness, but a full year's work. The farther we can go in that direction, the better it will be. Nothing will give a better return than money spent in welfare work and in reducing sickness.

The resolution was then put to the meeting, and carried unanimously.

THE DIVIDEND.

The PRESIDENT: I beg next to move:

"That the following dividends be now declared—viz., 6 p.ct. per annum for the half-year ended the 31st of December last on the preference stock, and 6½ p.ct. for the year ended the 31st of December last on the ordinary stock, less the interim dividend paid in respect of the first half of the year; and that warrants be transmitted to the registered addresses of the proprietors by post for the amount of such dividends."

Mr. W. A. S. THEOBALD: I think it is not inappropriate that I should be called upon to second this proposal, for I have the honour to stand here as one of the representatives of that great body of co-partners whose intelligent work and keen practical interest in the prosperity of this business have in no small measure rendered possible the motion which is now before you. At any rate, of this I am sure—and I think you will agree with me—that if the co-partners of this Company were not animated by a better spirit, and did not work at a more reasonable pace, than we know unfortunately prevails in a vast number of industrial undertakings which try to carry on their business without co-partnership, the shareholders would be lucky indeed if they ever received a higher dividend than the standard rate, even if they were fortunate enough to earn that. Remembering the disadvantages to which you have been subjected, and the sacrifices which you have been called upon to make, in years not very long ago, I consider that, in view of the working of the past twelve months, as a matter of justice, the rate of dividend now proposed is merely that with which you can be reasonably expected to be content, while, as a matter of prudence, in present circumstances I think it is as much as you would desire to claim. Therefore, I have great pleasure in seconding the proposition.

The resolution was unanimously agreed to.

RE-ELECTIONS.

The PRESIDENT: It is now my pleasure to move:

"That Mr. Frank Bush be re-elected a Director of this Company."

Mr. Bush is one of those who has been longest associated with the Company; and his advice is always to the point, and most valuable.

The VICE-PRESIDENT: I am pleased to second that. I should like to tell you, and Mr. Bush also, that there is no member of this Board who has the confidence of the rest so absolutely completely as Mr. Bush has.

The motion was carried.

The PRESIDENT: Now I propose:

"That Mr. Benjamin Robert Green be re-elected a Director of this Company."

The VICE-PRESIDENT seconded this, and it was agreed to.

Mr. BUSH: I beg to thank you for re-electing me a Director. It is a position which I much appreciate and value.

Mr. GREEN: I can imagine no more attractive position to one who has had a lifelong association with the gas industry than to occupy a seat on the Board of the South Metropolitan Gas Company. I assure you that to hold such an office is a privilege I much appreciate, as I do also the manner in which you have been good enough to support the resolution.

On the proposition of Mr. A. B. PASMORE, seconded by Mr. R. GARRAWAY RICE, it was agreed:

"That Mr. Charles P. Crookenden be re-elected an Auditor of this Company."

Mr. CROOKENDEN: I have been associated all my life with the gas industry; and it gives me great pleasure to serve this Company. We have listened to a very able address.

EXTRAORDINARY GENERAL MEETING.

A BILL TO BE PROMOTED.

The PRESIDENT: We now come to the extraordinary general meeting to consider the Bill which we propose introducing into Parliament; and I will ask the Secretary to read the advertisement convening this meeting.

The SECRETARY proceeded to do this.

The PRESIDENT: Well, ladies and gentlemen, I will not take up very much of your time with this Bill, which is a short one; and unless the unexpected happens, in all probability it will be the last for which I shall be responsible. I think with it we shall have got a charter which will enable us to carry on our business for a good many years—certainly until, in accordance with the terms of our last Act, we have to submit ourselves to Parliament for a review of our stewardship. The Bill is to extend the limits of supply of the Company; to increase the capital powers; and for other purposes.

The preamble refers to the areas concerned, which are very small. They have been a matter of discussion, and are now a matter of agreement, between ourselves and a neighbouring Company—the Wandsworth, Wimbledon, and Epsom District Gas Company. It recites the various powers given by the Acts of 1916, 1918, and 1921; and it refers to the capital raised and the borrowing powers granted, as well as to the need for additional capital.

BASIC DIVIDEND ON NEW CAPITAL.

Then it alludes to a clause in the 1920 Act which I must recall to your memory. Our proposal in that year was a basic dividend rate of 6 p.ct. Parliament, after hearing our case, decided that they would give us 5 p.ct. for the capital we had already raised, and 6 p.ct. for what we might in future raise—that is to say, on ordinary capital. Well, the capital is subject to the auction clauses; and it would be inconvenient if we had two kinds of ordinary stock. Upon considering the matter, therefore, your Board came to the conclusion that the decision of Parliament in 1920—arrived at, as we quite believe, with a desire to help us—would be better not taken advantage of. So there is a clause in this Bill by which the 6 p.ct. standard on future ordinary capital which may be issued is reduced to 5 p.ct. So much, then, for the preamble.

EXTENSION OF LIMITS OF SUPPLY.

Coming to the clauses, following upon the formal matter, there is the one relating to the extension of the limits of supply. It refers to a small area which we supplied with gas a great many years ago, when it was derelict. It was called "Lonesome;" and that was a very good name for it when I first knew it. A sub-section to the clause deals with a small part of the area which happens to be in Mitcham. Then we come to the question of capital; and if you look at our statement of capital in these accounts, you will see that we have no power to issue further loan capital, and that we have only power to issue further ordinary capital to the extent of £887,000. Under certain conditons, this might disappear very quickly; and what we want to do is to get your consent to the powers for which we are asking in our Bill to increase our capital to the extent of £1,000,000, and to increase our borrowing powers to something like, but perhaps not quite so much as, the proportion that is usual in similar undertakings to-day. Debenture stock to be created is to rank *pari passu* with that already issued. The next clause states that preference or debenture stock may be redeemable. Clause 10 amends the Act of 1920 in the manner to which I have just referred—that is, with regard to the basic dividend on new capital. The dividend payable on any preference stock to be issued is to be left to the decision of the Board. The mode of issuing stock or debentures is regulated, with the exception of stock issued in respect of co-partnership and of stock issued in respect of an associated company—that is, a transaction of the kind which we carried out last year with the South Suburban Company.

SHARES IN OTHER COMPANIES.

Another clause fixes the minimum holding of stock at £1. Then there is a saving clause with regard to the application of new capital raised. There is power to subscribe for shares or loans in associated companies; and that concludes the provisions relating to capital. We from time to time think it desirable to incorporate one or two technical matters which will be helpful to us in our business; and there is a clause in the present Bill which will require the adoption of valves of special design where anyone is using gas in conjunction with air under pressure. If an industrial consumer manufactures producer gas and uses it alternatively with the Company's gas he will, in order to prevent the producer gas from entering the Company's mains, be required to insert a non-return valve on his service. There is also power to inspect the valves and test them.

PREVENTION OF IMPROPER USE.

A further clause makes it unlawful to use gas in any way disturbing to other consumers, and gives the Company power to suspend supply in such circumstances. Another clause to which I must refer is one which is already part of the Electric Lighting Acts—that is, giving power to lay pipes in what are called undedicated roads, at the request of those persons who happen to be living in them. At present there is no power of that kind; and it is thought that we should bring our business to the same level of practice as that prevailing in the electrical industry. That is the Bill; and having regard to what has taken place in the past, I am sure you will agree with me that it is not a very complicated one. I will now move:

"That the Bill now submitted to this meeting, entitled 'A Bill to extend the limits of supply of the South Metropolitan Gas Company; to increase the capital powers of the Company; and for other purposes,' be, and the same is hereby, approved, subject to such additons, alterations, and variations as Parliament may think fit to make therein."

The VICE-PRESIDENT: I am pleased to second that. The President said at the beginning that this was the last Bill he was going to present. I can assure you that you will hear him explain other Bills to you in the future.

The resolution was carried unanimously, without discussion.

VOTE OF THANKS.

Prof. H. E. ARMSTRONG: I beg to move: "That the best thanks of this meeting be accorded to the Directors, officers, and other employees of all ranks, for their attention to the interests of the Company." After listening to your speech, Sir, knowing what I do of the services rendered to the public by all concerned in the work of your Company, I have difficulty in expressing the satisfaction I have in proposing this vote of thanks. In the past, I have not always been welcome at these meetings. A pupil of the late Sir Edward Frankland, who was at one time—before your time, Sir—the authority on gas, I have always been watchful of gas—since 1866, in fact, when I heard Frankland's lectures on the "Luminosity of Flame." Of late years, I have also been watchful of low-temperature carbonization, and have advocated the production of a solid fuel which could be burnt with satisfaction in the domestic grate. I have more than once challenged you to produce it. You tell us that you, too, are now on the watch for one. I have little doubt that you will ere long, not merely watch, but be up and doing. I have actually been privileged to burn, during the present and past winter, a material produced by you which is not far from being a satisfactory low-temperature fuel. Up to the war I complained constantly that, although your industry was essentially a chemical industry, there were no chemists in it. To-day you are yourself claiming to be what I long ago said you were—but not only claiming. You have a staff of the highest scientific ability, and are carrying on your work in a spirit of thoroughness, and with measured efficiency, which most other industrial concerns may well envy. Your gas is not only good, but has the virtue of constancy—by no means a common virtue. When I look at

the almost straight, long-drawn-out line of thermal value registered by the recording calorimeter angel who watches you day after day, I can only wonder that it should be possible to manufacture so consistently on so vast a scale. Only the unremitting, ever-honest attention of all concerned could give the results you obtain. You speak of soon giving us a "comfortable heat." The phrase, I hope, will become historic. I trust you may be successful. I welcome especially what you are doing, and have already done, to make the use of ordinary hard gas coke possible as a domestic fuel. Your new stove is so promising that I begin to think that low-temperature carbonization may have entered the field too late to capture the public, as it assuredly would have done, when the field was clear a few years ago. I have said more than enough, I believe, to secure for my motion the most hearty assent of this meeting.

Mr. MANLEY seconded the motion.

Mr. WILLIAM PHILLIPS: I should like to support the vote. I think that the organization, and the administration, and the general run of the South Metropolitan Gas Company is to be admired; and it has secured the admiration of gas people at large. I am glad you are considering the question of low-temperature carbonization; but I can assure the proposer of the vote of thanks that the gas industry generally has been watching it very closely for some time past.

Mr. T. A. BRADDOCK: I also should like to support the proposition. Dr. Carpenter is not always bound by custom; he sometimes creates precedents. I am sure I am merely voicing the opinion of everybody present when I say that we owe a deep debt of gratitude to the President, Directors, staff, and employees for their conduct of the business of the Company.

The vote was carried by acclamation.

The PRESIDENT: I am much obliged to you for your vote of thanks. Prof. Armstrong has reminded me that one of my early text-books was by his old friend Frankland. In spite of what the Vice-President has said, there is a certain underlying truth in my suggestion with regard to future Bills. I feel that a great deal had to be done to carry out what I had in my mind before the war—but which the war interrupted—and that was to endeavour to put our gas business not only upon a commercial basis, but upon a more scientific one than had hitherto been the case. There is certain competition, I suppose I may say, to-day between Industry and Bureaucracy. I touched very slightly upon it in my remarks. We all believed that "Dora" was a reserved, quiet-living spinster. It has been whispered to me that that is not quite correct, and that in the early days of the war she became matrimonially attached to a well-known public man. That union has been very fruitful; and a great many "little Doras" have come into the world—all of them, unfortunately, girls. And so "Dora" is busy to-day endeavouring to create Government posts, so as to provide husbands for her family of daughters. [Laughter.] On behalf of everyone connected with the Company I thank you for the manner in which the vote was proposed and accorded.

HORNSEY GAS COMPANY.

Cheapest Gas in London.

The Annual Ordinary General Meeting of the Hornsey Gas Company was held at No. 5, Great Winchester Street, E.C., on Friday, Feb. 24—Mr. A. M. PADDON, M.Inst.C.E. (Chairman of the Company), presiding.

The SECRETARY (Mr. K. Leslie Mortimore, A.C.A.) read the notice convening the meeting.

The Company's seal was affixed to the Corporate list of proprietors, which latter was signed by the Chairman.

The report of the Directors, and the accounts for the year ended Dec. 31, 1927, were taken as read.

The CHAIRMAN, in moving that the report and statement of accounts be received, adopted, and entered on the minutes, said that if the statement that it was the duty of the Directors to present to the proprietors should be held amenable to explanation or criticism, it could only be on account of its merits rather than any defects which it contained. During the year, the Company had extended its business to the extent of 3¼ p.ct.—not a large amount in itself, but one which compared favourably with the progress made by other undertakings during the same period. The incidence of this increase was uneven. The greater portion of it accrued in the more or less disturbed circumstances of the early portion of the year, supervening upon the circumstances of the great coal strike of 1926. Towards the end of the year the fall in the cost of all forms of fuel had mitigated the demands upon gas by the general public; and the progress made then was less marked; but the figure he had given, being an average figure, conveyed exactly and accurately the advance which had been made.

The first two statements in the accounts were somewhat formal in character, but they required a little closer attention on this occasion than was ordinarily the case. Statement A—statement of capital stock—showed that there was an amount of some £120,000 authorized but unissued, and Statement B—statement of loan capital—showed that over £105,000 of debenture stock was still at the disposal of the Company. The summary below the statement showed that the total capital received was £383,163. The description, however, was a little misleading; the Company had not received this amount, because of certain amounts added on conversion, and the arbitrary transfer, recorded in the first table, of £25,000 to the capital account, which did not bear any dividend, and, therefore, made no demand upon the consumers through the price of gas. If these amounts were deducted—they were matters of account rather than actuality—it would leave the capital at very little over £300 per million c.ft.; but if one were to apply yet another criterion, through the medium of Account C—capital account—and test the capital by the total amount that had been expended, it would then be seen that the capital per million c.ft. would amount to only about £350. To those conversant with gas affairs, these figures would be significant; and the corollary on this occasion was that the Company could not continue to carry on such an active, and, he believed he might call it, such an efficient, business without having resort once more to the public for capital. Inasmuch as the Company's last appeal to them for that purpose was made eighteen years ago, the Company could hardly be held to be incontinent in their requirements in this regard.

The capital account showed that the Company were overspent by £12,765. He would not say that this aggravated the situation, but it intensified it; and if one looked at Account F—special purposes fund account—and also at the balance-sheet, wherein the co-partnership fund was referred to, one would find that, though the Company had invested in independent trustee securities certain amounts of these liabilities, they were not fully invested; and this must be taken into account also in connection with the extended demand for capital.

He supposed, in the light of the figures he had already given—and before proceeding to the actual record of the Company's trading—that there was already a considerable inducement to the gas investor to put some more of his money into this undertaking. The investor had not had an opportunity for a very long time; and if he did not take this opportunity, he would probably not get another for a very long time either. As this stock had certain attractions, and had special intrinsic merits, on the figures now put forward, he took it that when the Company asked for the moderate amount of capital they required, they would get it. He would be extremely surprised if the applications did not exceed what the Company were prepared to accede to.

Dealing with the revenue account, he said there were two very significant figures at the top of the credit side. They showed that the results which the Directors had to present had been, he might almost say, "achieved," with a price of gas which had not exceeded 9·6d. per therm at its maximum, and had been as low as 9d. per therm during the twelve months. A great many undertakings in the vicinity of the Company's area, and trading in common circumstances, would be glad if their normal price were the Hornsey Company's maximum price. In other words, 9·6d. per therm was not a high price, and certainly not high as a maximum in disturbed conditions. But that was behind. The Directors had anticipated the trading for the current year by proposing originally a further reduction to 8·6d.; but if one looked at the somewhat flamboyant statement issued by the Company, one would see that as a matter of accomplished fact the charge for gas in Hornsey from Jan. 1 this year would be 8d. per therm. This restored the Company to the position of charging the lowest price for gas in the whole Metropolitan area, for the whole statutory area of supply. He had to qualify the statement in this way because the Company of one of his colleagues at the end of the table was also supplying at 8d., but it was not so fortunate as the Hornsey Company, because it could not do that all over its area. Therefore, he did not think this sporadic achievement was strictly comparable with that of the Hornsey Company.

The Company had sold 828 million c.ft. during the year, which marked the importance of the undertaking. This represented an increase of ·28 million c.ft. To be strictly technical, he supposed he should refer to therms rather than to cubic feet; but he had been so long in the undertaking, and his early training was so remote, that cubic feet still meant a little more to him than did therms. It did not necessarily mean the same to the consumer, but the Company safeguarded him by supplying him on the thermal basis. The total receipts from the sale of gas, and the hire of meters, stoves, and fittings, showed an increase of nearly £14,000; and the shareholders would already have been satisfied that this had not been attained through an inordinate price of gas. The receipts from residuals showed a decrease, in the aggregate, of £210; and if this were considered merely as a *prima facie* statement, it would not be unsatisfactory, because most people had anticipated a material reduction in residuals during the past year, and it had been one of the administrative surprises of those responsible for gas undertakings that the residuals had not fallen off more than was actually the case. Behind this lay a somewhat long and complex story, with which he would not weary the shareholders. The fact that the figure of £38,582—the total receipts from residuals—was less by some £5500 was a mere matter of accounting, because the Company had made less water gas, and had, therefore, debited themselves on the other side of the account with less coke for that purpose; and the fact that the aggregate, in spite of this reduction of £5500 was only £210 less demonstrated that the other residuals and the balance of the coke must have been disposed of to very great advantage. This was supported by the fact that for coke sold to the outside public—not coke used in the undertaking—there was an increase of over £1500. Tar also had brought in nearly £4000 more; the actual figure being £3747. The figure with regard to sulphate was rather significant. Sulphate, the manufacture of which was almost an impracticable process from an economic point of view to-day, had brought the Company a profit of £1620, whereas many undertakings had had to show a loss under this head. This demonstrated that where sulphate of ammonia was treated in the most favourable circumstances—*i.e.*, where it was made by the undertaking producing the raw material, thus avoiding the charges of an independent organization, as well as transport charges—it could still be made at a profit. He was extremely doubtful that, if the treatment of this residual were undertaken by any adventitious concerns, any profit could be made at all.

Coming to the debit side of the revenue account, he said that the

dominating figure, as one would expect, was the reduction in the cost of coal. The amount saved was £24,357; and this, of course, was the cardinal and paramount economy of the year. The Company had spent nearly £3000 more on their works, so that there was an assurance that the profit had not been reaped before efficiency had been maintained. Also, over £1000 more had been spent on the repair, renewal, and refixing of meters. The other charges were normal, and called for no particular comment, but he pointed out that the Company had made contributions to the co-partners' sick and hospital funds of £507; to the co-partnership appropriation £1678—and he wished it could have been larger—and that the appropriation to the benefit fund, by which they looked after their weekly servants, was £1725. When all these apportionments had been made, the total expenditure for the year was £21,477 less than in the previous year. The receipts were £13,623 more, and those two figures conspired—or should he say "combined"—to give an extra profit of some £35,000 on the year's working, at the low price for gas to which he had referred.

This was satisfactory, but it brought him to the next statement, as to the appropriations. He would not say that here their troubles began, but some complexity supervened. There was brought into the profit and loss account, on the credit side, £12,593, and there was a balance of net profit, in accordance with the ancillary figures on the debit side, of £41,089. The amount required for the half-year's dividend was £7275; and the Company, therefore, were in the ostensible position of carrying forward £33,813, which, he would say at once, was in excess of the statutory limit allowed by Parliament. Though Parliament required the Company to do certain things, it did not superimpose upon them the duty of a prophet; and until an account such as this was struck, it could not be stated definitely what the excess on the year's trading would be. The Directors had anticipated that it would be ample, because they had reduced the price of gas in the middle of the year, and again before the end of the year, in prospect. The margin of profit, however, was in excess of what they had anticipated, or could with prudence have anticipated; and, inasmuch as it was in excess of what Parliament had said the Company could carry forward, it was the obvious duty of the Company at once to restore to the consumer what Parliament required them to do, by a corresponding and commensurate reduction in the price of gas. This had been done, and by that reduction to the extremely low figure of 8d. per therm the balance would be restored to the consumer during the coming period. This, he considered, was as far as the Company could be expected to show compliance with the injunctions and requirements of Parliament. The surplus profit, by this retrospective reduction in the price of gas, was restored to the consumer; and he was sure that would be gratifying to the consumer; and would inure and conduce to the popularity of the Company, with a similarly favourable effect upon its future business.

With regard to the special purposes fund, the Company had made a transfer to this of £2500; to the reserve fund they had made the largest appropriation they were able to make. This was distributable, but undistributed, dividend, in accordance with the Directors' recommendations; but it did not leave that fund in a wholly satisfactory position. With the very important reduction in the price of gas which he had indicated, it was possible that the Company would have a larger sum at their disposal twelve months hence; and he believed the shareholders would like to see the reserve fund, as the Directors would, assume more important dimensions. With regard to the benefit fund, he said the balance-sheet showed that this was the subject of a deposit at the bank. Some held the view that, inasmuch as it was a prospective benefit for the workpeople, it should be definitely earmarked, apart from the ordinary revenue of the undertaking. Some companies took a very different point of view indeed; and it might be arguable whether such funds as the special purposes, or the old insurance or maintenance funds might not with perfect propriety be invested in the business which they were supposed to benefit. But the Directors of the Hornsey Company held the view that a reserve fund—which, after all, was the property of the proprietors, because they had foregone it by way of dividend—or a fund which brought them into fiduciary relationship with their workpeople, should be invested outside the business. He put this forward as a policy which he knew had the support of every one of his colleagues.

Discussing the future of the undertaking, he regarded the prospect as being fairly propitious. The Company had purchased coal beyond the requirements of the present year on very favourable terms, and though this was not an absolute assurance, as they knew from bitter experience, nevertheless the general conditions were such as to give them considerable confidence as compared with what they could claim two years ago. There was a better spirit, a better conception of the relations between employers and employed, even in the coal world; there seemed to be a genuine effort to re-establish some sort of stability in those relations, and the opportunity to create disturbance was not so great as it was two years ago. Even those occupied in creating industrial disputes found it a very costly business, and one which could not be carried on indefinitely; and there was a certain quiescence in the industrial world which should give the Company's future commitments in regard to coal an added security in the future. Then there was a hopeful feature in the future of gas undertakings generally with regard to residuals. They had during the last few years created a new and important demand on the part of the public. He had already said the Directors were surprised to find that the residuals should have supported the accounts in the way they had done, but he did not think there was any reason to anticipate that there would be any falling-off in the value of residuals during the current year. In regard to both tar and coke there was a growing demand and a growing comprehension of their utility and necessity on the part of the public; and all this would conduce to the future prosperity of the Company. There was only really one economic disability that they carried forward, and this it was largely in their own power to qualify. The outstanding commercial disability at the present time in connection with the production of gas was the exorbitant price of gas oil. It was some forty years ago that the use of carburetted water gas was first introduced in this country, as a solution of the problem of how to maintain the illuminating power of gas without excessive cost. It did meet that, and it could only do so by the ingrediency of oil. Not only did it mitigate the difficulty of enriching gas, but it occasionally provided a cheaper form of producing gas to be supplied to the public, by reason of the low cost of oil. The use of water gas in connection with the staple coal gas industry had brought many technical advantages. Water gas in itself, by reason of the smaller amount of air that it demanded for its combustion, the reduced area of the flame, and, therefore, its more complete combustion and its higher flame temperature, had all brought great advantages in the use of gas which were not clearly realized. All these advantages were connected with the use of water gas without any regard to oil at all; in fact, in so far as oil was used, it tended to dissipate and decrease the advantages. Then came the great change, by which illuminating power had disappeared and the calorific standard—which was the true standard of value between the public and the gas industry—had taken its place. Then the question was purely one of how heat could be more cheaply produced. It was a problem of by what process could they most economically produce the product they had to sell—namely, heat. Since that had been so, the balance had shifted heavily towards the production of heat by coal gas. The making of water gas had the valuable quality of regulating the supply of coke. But coke, which was unwieldy and difficult twenty years ago, was not so to-day. In the early days, it might almost have been referred to as refuse; but to-day it was called a residual, and it might deserve a better designation yet, with its growing value. All this tended to make oil not only costly, but also very largely unnecessary; and if the gas as produced by oil was going to cost as much as it did to-day, the technical policy of the gas undertakings would be to produce coal gas with a small admixture of blue gas, and the elimination of oil from the process altogether. This, however, would take time. It meant some alteration of plant, and it meant waiting to a certain extent upon the now rapidly developing supply of coke under the new conditions. But when these two things had been achieved, he believed it would be clearly established that at the present price of oil it was a disability and a hindrance rather than a help to the gas industry; and unless the price were qualified, it was going to be a reducing, if not a disappearing, element in the technical process of gas manufacture.

Mr. G. W. CAREY (Deputy-Chairman) seconded the adoption of the report and accounts.

There was no discussion on the report and accounts, which were adopted unanimously.

DIVIDEND.

The CHAIRMAN moved that the following dividends for the half-year ended Dec. 31, 1927 (being the final dividends for the year), be declared:

On the preference stock, £5 p.ct. per annum;
On the 5 p.ct. stock, 6½ p.ct. per annum;
On the 3½ p.ct. stock, 5 p.ct. per annum;

all less income-tax (making, with the interim dividends already paid on the 5 p.ct. stock and 3½ p.ct. stock respectively 6½ p.ct. and 5 p.ct. for the year); and that such final dividends be paid on Thursday, March 1.

Mr. T. W. SEAGER BERRY seconded.

The resolution was carried.

RE-ELECTION OF DIRECTORS.

The CHAIRMAN, proposing the re-election of the retiring Directors (Mr. J. M. Miles and Mr. T. W. Seager Berry), said that their friend and colleague, Mr. Miles, was very ill, and had been so for a little time past, but he was certain that, having regard to Mr. Miles' great value as a Director—for he was a man of great experience and singularly clear judgment in gas matters—and also bearing in mind the long and continuous service he had rendered the Company, the shareholders would like on this occasion to re-elect him to his seat on the Board. He (the Chairman) was sure that all the shareholders shared the hopes of the Directors that providentially Mr. Miles might be able to come back to them. With regard to Mr. Berry, he said he could not convey through the medium of words how highly the Directors valued his presence on the Board. They were all cognizant of and conversant with the great services he had rendered, and hoped he would continue to render them in the future. He (the Chairman) had particular knowledge of the value of Mr. Berry's services. As time went on, the Company became more and more dependent upon the will, capricious though it be, of Parliament or of Government Departments; and it was a science in itself to keep the Company properly advised as to its true position with regard to Governmental enactments and Governmental requirements. The difficulties in this connection were almost always anticipated by Mr. Seager Berry, and disposed of before the Company were troubled with them. He was sure the shareholders would recognize his past services and intelligently anticipate his future services by re-electing him.

Mr. F. H. JONES seconded.

The resolution was carried unanimously.

Mr. SEAGER BERRY, expressing his thanks for his re-election, said he very sincerely appreciated such a mark of the confidence of the shareholders.

RE-ELECTION OF AUDITOR.

On the motion of Mr. K. R. MACKAY, seconded by Mr. W. D. OVENS, Mr. H. A. Floate was re-elected an Auditor of the Company.

Mr. FLOATE briefly responded, and expressed appreciation of the manner in which the accounts had been kept by Mr. Mortimore, the Secretary.

VOTE OF THANKS TO OFFICERS AND STAFF.

The CHAIRMAN proposed a vote of thanks to the Engineer and

General Manager, the Secretary, and other officers and staff, and also to the workmen of the undertaking, for the way they had promoted the results which it had been the pleasure of the Directors to put forward. Very much of the success of the undertaking—he could not say the exact proportion, but it was very big—was due to the technical skill and devotion of Mr. Buckley (the Engineer and Manager). Mr. Buckley was modest, and confined his attention very largely to his own undertaking, so that he was not heard of outside it as much as he might be; but as a technical and a commercial officer his qualities were of the highest order. In Mr. Mortimore, the Secretary, the Company had an experienced, sagacious, and devoted officer, who lived up to the traditions of the undertaking, and who had the absolute confidence of the Board and the officers of the Company. In a tribute to the workmen, for the loyal service they had rendered, he said the Directors had done all they could for the men, and the latter had proved worthy of it. The better relations existing between them and the Directors had been steadily built up, and the Directors now felt that they had the interest and the loyalty of the workmen throughout. The Company cared for the men in health and in sickness, and the men knew that their interests lay in the prosperity of the Company; and he was sure they would not sacrifice lightly the new relations which had been so carefully and laboriously created. He knew, from his visits to the works, that they appreciated what had been done, and that they were anxious to make their contribution to a common result.

Mr. MACKAY, speaking not only as a shareholder, but as a consumer of the Company's gas, paid a tribute to the officials and the workmen of the Company, and added that, as a consumer, he always received every courtesy and prompt attention from them all.

The vote of thanks was carried unanimously.

Mr. BUCKLEY, responding, said that if there was one thing he had tried to achieve more than any other, it was to put the Company into a position to supply cheap gas; and he believed he had done this. He was sure the other officials of the Company, and the co-partners, appreciated as much as he did the remarks which had been made in regard to them. As the Acting-Chairman of the Co-partnership Committee, he was more than gratified at the interest the Committee were taking in the Company's business. The more he saw of the Committee, the more he was satisfied that their minds were in the right direction. While he was satisfied that the prosperity of the gas industry depended mainly on the price of gas, he felt that there were other things which were very important. The very best service must be given to the consumers, and he was sure the time was overdue when gas appliances should be supplied at much lower prices. These remarks applied more forcibly perhaps to cookers and fires, if for no other reason than the enormous increase in the demand during the past several years.

Mr. MORTIMORE also briefly responded to the vote of thanks.

VOTE OF THANKS TO THE CHAIRMAN AND DIRECTORS.

Mr. E. L. BURTON proposed a vote of thanks to the Chairman and Directors for their able administration of the affairs of the undertaking during the past year. The balance-sheet was one of the most flourishing that could possibly be put before any gas company, even in more auspicious times than those through which the Company had been passing recently.

Mr. F. W. CHURCH seconded, and the vote was carried with acclamation.

The CHAIRMAN briefly responded, and the meeting then closed.

CROYDON GAS COMPANY.

ANNUAL GENERAL MEETING.

The Annual Ordinary General Meeing of the Company was held on Friday, Feb. 24, at the Offices, Katherine Street, Croydon—Mr. WILLIAM CASH, J.P., F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. Frank F. Wood) read the notice convening the meeting, together with the minutes of the last annual meeting and extraordinary meeting; and the report and accounts for the year ended Dec. 31 were taken as read.

SYMPATHY.

The CHAIRMAN said that, before proceeding to the business of the meeting, there was a matter of a domestic character to which he wished to refer. The proprietors would notice the absence from the Board table of the Deputy-Chairman, Mr. Thomas Rigby. This was an unusual circumstance; and he was sure all present would join the Directors in extending to Mr. Rigby their sincere sympathy in the cause of his absence. He was sorry to say that Mrs. Rigby passed away in the early part of the present week.

TWO DISSIMILAR PERIODS.

In proposing the adoption of the report and accounts, he felt that he could do so with very great confidence, because there was being laid before the proprietors that day a set of accounts which might be regarded as eminently satisfactory. It was not his intention to spend a great deal of time in analyzing them, because they were set out in the fullest manner, and showed, for comparison, the corresponding figures for 1926. He would, however, ask them to remember that 1926 was an entirely abnormal year. While 1927 had been very satisfactory and prosperous, 1926 was altogether different. Also, he would impress upon them the fact that, while 1926 was adversely affected by the high cost of foreign and other coal specially bought during the national stoppage, the early part of 1927 was similarly affected, because they carried into the beginning of that year the balance of the high-priced stocks under the contracts it had been necessary to make to meet their requirements. Further, in the early part of 1927 they had the benefit of the high prices of residuals, which unfortunately did not continue during the whole of the year. Again, he would remind them that during 1926, in consequence of the difficulty which consumers experienced in buying fuel, of any kind, there was an exceptional demand for gas.

GRATIFYING GROWTH OF OUTPUT.

Bearing this fact in mind, he thought the proprietors would agree with the Directors in regarding the increase of 3·89 p.ct. in the sale of gas as very good indeed. This represented an additional quantity sold of almost exactly 100 million c.ft. It was also interesting to note that during the extremely cold weather which was experienced round about Christmas time, the exceptional demand upon the output was such that Dec. 20 constituted a record, with an output for the 24 hours of very nearly 13 million c.ft. One difficulty with which the Directors had had to contend during the past year was that of anticipating the results from quarter to quarter; but they had considered the interests of the consumers by reducing the price of gas at every opportunity.

PRICE BELOW PRE-COAL STOPPAGE LEVEL.

It would be seen from the report that the price of gas was reduced from 1s. per therm on Jan. 1, 1927, to 11d. on April 1, to 10·4d. on July 1, and to 9·8d. on Oct. 1. This last figure was the pre-coal strike price, which had been raised on Oct. 1, 1926, to 10·4d. Then there was a further reduction on Jan. 1, 1928, to 9·6d.; while the Directors had announced a further reduction on April 1 to 9·4d., which would be 0·4d. below the price that was ruling at the time of the outbreak of the coal stoppage. In addition to this, they had done something for the Caterham consumers, inasmuch as they had now reduced the differential price charged there to 0·4d. from 0·8d. per therm, at which it had stood for a considerable period. This was a very fair and proper thing to do, because the growth of the business in Caterham warranted the consumers there being charged a price more nearly approximating to that in Croydon than had hitherto been the case.

SOME STATISTICS.

Looking now to the future, they had, as he had said, further reduced the price of gas, because their coal contracts were slightly more favourable; and they extended to the end of the current year, and even a little beyond that. One uncertainty was the price of residuals. Looking at the growth of the business from another point of view, he thought the proprietors would regard as entirely satisfactory the fact that during the past year the Company had gained 3442 new consumers—2129 ordinary and 1313 prepayment. This brought the total number of consumers on their books to 67,061. In the twelve months they had laid 15 miles of mains, and used over 100 miles of wrought-iron tubing for services and internal work. There had been completed the 36-in. main in Purley Way, and a 24-in. main from Purley Way to Wallington, in order to improve the supply of gas to Beddington, Wallington, and Carshalton. With reference to the works, he might say that they had let contracts for new carburetted water gas plant; and the Board had been considering that day with their Engineer a scheme for the re-modelling of one of the existing retort houses. The showroom sales had been well maintained; the usual large number of orders from consumers having been received. The number of cookers and fires on hire had increased by some 1800, but this was no real measure of the extension of gas apparatus in the district, for they had sold during the year nearly 9000 additional appliances—cookers, stoves, water heaters, &c. He would like to take this opportunity of saying that the work of the distribution department had been very well done. The chief aim of the officers and staff was to give to all the consumers throughout the district the best service they possibly could, so that the Company might possess—as he believed they did possess—a body of consumers who were thoroughly satisfied with what the Company were able to do for them.

FIGURES FROM THE ACCOUNTS.

Comparing the results of 1927 with those of 1926, he would point out that in 1926, in order to pay the dividend that was then declared, they had to take from the reserve fund £2618, and from the insurance fund £5381; while in addition to this they used up the whole of the available carry forward brought in from 1925, amounting to £10,088. Thus there was a deficiency on the year 1926 of £18,087. The year now under review showed a very different picture. They were proposing to add £6889 to reserve and £10,000 to the renewal fund, and were carrying forward £14,681. These sums totalled £31,570; but if it was thought that the Company were doing too well, he would ask their critics to remember the figures of 1926. Because, after all was said and done, if the two years were taken together, while 1927 was eminently satisfactory, no one could say that the Board had done anything unreasonable in dealing with their available funds in the way he had indicated. In addition to what he had mentioned, they were paying £10,000 to the pension fund, which was guaranteed by the Company. It was a contributory fund, to which the workpeople and officers paid in; and the Board had recently had a report upon the actuarial position of the fund. Their Actuary told them that it needed strengthening, having regard to the liabilities which would ultimately fall upon it. The proprietors would notice in the revenue account that the Directors had substantially increased the revenue charge contribution to this fund; and, in addition, in view of the opinion expressed by the Actuary, they felt justified, as they had the money available this year, in making a

special contribution of £10,000 to the fund. It was essential that the fund, upon which the welfare of their workpeople depended, should be made thoroughly sound; and these increased contributions would have to be continued until they had another valuation in some years' time, to see how the matter might then stand. The present position was due to two facts. In the first place, the age of the employees when they came on the fund was rather high; and, secondly, it was based upon a scale of wages which had since been substantially increased, and of course the pensions were based upon the salaries and wages which were received at the date of retirement.

AN INCREASE IN DIVIDEND.

Reverting to the allocation to the renewal fund, he might say that the expenditure on the coal gas plant which they were going to incur represented to a considerable extent a renewal. It was intended to put down better and more modern plant which would give them a distinct advantage on revenue account; and it was desirable to anticipate a revenue charge. This was the reason for allocating to the renewal fund the special sum to which he had referred. The fund, with this addition, would amount to some £13,000; and the Board would like to see it even bigger. The total permissible fund under the Statutes was very large; and the present allocation was lower than the Board were authorized to make. He had already explained about the reserve fund. The permissible dividend under the sliding-scale would have been in June 12s. 6d. higher, and for the December half-year, with the lower price of gas, £1 2s. 6d. higher, than they were paying. Thus they felt completely justified in so increasing the distribution for the second half-year that the dividend for the whole year would work out at 6¾ p.ct., as compared with 6½ p.ct. in 1926. The extra ¼ p.ct. amounted to only £1969. The co-partners as a result of this would get slightly more bonus; the increase being a little over £400. In the opinion of the Board, the co-partners thoroughly well deserved this extra distribution.

DOMESTIC MATTERS.

Turning next to some domestic matters, it would, in the first place, have been noted that Mr. William J. Russell had thought it wise to give up work and retire altogether. He retired from service as an officer some time ago, and had been a member of the Board for the past 25 years. Mr. Russell had a wonderful record in serving the Company in one capacity or another ever since 1863—that was to say, for 65 years. He (Mr. Cash) was sure the Directors' record of their appreciation of this long and valued service would be joined in by all who knew Mr. Russell. The vacancy on the Board had been filled by the appointment of Mr. Guy Savory, a gentleman well known in the public and business life of Croydon. The Directors counted themselves fortunate that he had seen his way to accept the position. Then Mr. Caddick, their Engineer, who had been with them 28 years, and was suffering from strain, had been advised by his doctor that it would be well for him to retire. The proprietors had often heard Mr. Caddick's work eulogized; and in the report the Directors recorded their appreciation of his long and efficient service. In Mr. Caddick's place the Board had appointed Mr. Walter Grogono, who came to them with a most excellent record from the Gas Light and Coke Company, with whom he had had exceptional experience of all kinds, extending over a great number of years. Mr. Grogono had been on a gas-works practically all his life; and the Directors were extremely pleased with the fact that they had selected him. It was their belief that in him they had a man who was thoroughly up to date—an efficient engineer, a good manager, and a first-class chemist. They hoped he would remain with the Croydon Gas Company a great many years. Already he had done work which was bearing fruit. This alteration gave the Board an opportunity of revising their whole scheme of organization; and he was sure that all would agree they had done the right thing in appointing Mr. W. J. Sandeman their General Manager. He was a gentleman well known in Croydon, and throughout the gas profession; and there was no doubt whatever that he would fully justify the confidence which had thus been reposed in him.

ADVANCES IN THE INDUSTRY.

Those who were responsible for the administration of gas undertakings could not have failed to be struck with the zeal and efficiency of the technical advisers and officers throughout the industry. There were men who had been trained for their work in a way which was unknown forty or fifty years ago. The organizations for senior and junior officers were continually meeting and having discussions which must bear good fruit. Applied science was influencing the manufacture of products of better quality; and engineers were fitting up improved plant which resulted in reduced operating expenses. He might instance the better handling of materials, prevention of waste, utilization of waste heat in boilers, removal of naphthalene, the use of better quality material, concrete purifiers, and silica for retort settings. On the selling side, also, they were being supplied with improved and more efficient appliances. All these things tended to benefit the consumer by helping to bring about reductions in the price of gas, and all helped the gas industry in its fight with electricity and other forms of light, heat, and power.

COMPETITION WITH ELECTRICITY.

In this connection, he wished to say a few words about the position regarding electricity, and to refer them to a paper read recently by Mr. Thomas Hardie, in which he discussed the question of the consumption of gas and electricity in this country and in America. A great deal had been said about the growing use of electricity in America; and England had been accused of being behind-hand. But very little had been said about the increase in the use of gas in American cities; and Mr. Hardie in his paper remarked: "It is well to remind ourselves that in American cities, where the consumption of electricity is three or four times the consumption *per capita* in this country, the consumption of gas is also greater than it is here." Mr. Hardie quoted the following figures of gas consumption *per capita* in representative cities in this country and America:

	C.Ft.
London	10,100
Bristol	8,172
Sheffield	9,214
Portsmouth	9,037
Manchester	7,690
Washington	12,837
San Francisco	12,392
New York	12,325

The figure for Croydon was 8800 c.ft.

GROWTH OF THE GAS INDUSTRY.

Next he would like to deal briefly with the growth of the gas industry as a whole; and for this purpose he took some figures which were included in the Inaugural Address last October of Mr. W. J. A. Butterfield, Chairman of the London Section of the Society of Chemical Industry. These figures, compiled from the Board of Trade Returns, showed that the development in the use of gas had continued from 1882 to the present time at a progressively increasing rate. The figures were divided-up into periods. In the fifteen years 1883-97, the sales of gas increased each year, on the average, by 3618 million c.ft. In the next fifteen years, 1898-1912, the average annual increase had risen to as nearly as possible 5000 million c.ft.; while in the last fourteen years, 1913-26, the average increase per annum was no less than 5892 million c.ft. The war years appeared to have slowed-down the rate of increase; but the last two or three years had greatly quickened it. In the last 45 years, the number of premises supplied by gas had multiplied by four; while the average consumption was but little different at the end of the period from what it was at the beginning. The actual average consumption in 1926 was 32,900 c.ft. Croydon showed a quite satisfactory comparison with a figure of 38,000 c.ft. per annum per house. Mr. Butterfield went on to make another comparison which, if anything, was rather more striking than the figures just quoted. He took the total increase in the quantity of gas sold in Great Britain in the last five years over the previous year, and turned it into therms, and then compared this with the increase of electricity, on the heat unit basis, excluding unpublished figures relating to railway companies, tramway authorities, and non-statutory undertakings. The result was as follows:

—	Gas.	Electricity.	Ratio of Gas Increase to Electricity Increase.
1923	45,119,000	23,861,000	1·89 to 1
1924	76,326,000	22,673,000	3·37 to 1
1925	44,327,000	17,797,000	2·49 to 1
1926	54,056,000	7,165,000	7·54 to 1

These figures showed that the use of gas was increasing very much faster than that of electricity, when compared on the heat unit basis.

A GOOD INVESTMENT.

There were people who seemed to deprecate the investment of one's savings in the gas industry; but he thought this attitude was wrong. It seemed to him that there were good opportunities for people to invest in gas stocks, which at the present time were somewhat neglected. Take, for example, the ruling price of the sliding-scale stock in their own Company. This was about 104, with six months' dividend included, which made it roughly at par. He ventured to suggest that it would be very difficult to find a stock offering equal security and returning similar interest. In any comparisons that might be made Croydon would come out quite well. The increased sales of gas in 1926 over 1925 amounted to 82 million c.ft.; while, as he had already told them, the increase in 1927 over 1926 was 100 million c.ft. With the organization and the facilities they had for supplying the area entrusted to them, he thought the proprietors need have no fear so far as their investment was concerned, and that they ought to feel complete satisfaction with the accounts that were now presented. He concluded by moving:

> "That the report of the Directors and statement of accounts for the year ended Dec. 31, 1927 (a copy of which has been sent to each proprietor), showing a balance of £56,823 13s. 3d. available for dividends, be, and the same are hereby, received and adopted, with the exception of the paragraphs relating to the declaration of dividends, the election of Directors and an Auditor, and the remuneration of the Directors, which are to be considered separately."

Mr. CHARLES HUSSEY, J.P., seconded the resolution, which was unanimously passed, without discussion.

THE DIVIDENDS.

The CHAIRMAN next proposed:

> "That dividends at the following rates per annum for the half-year ended Dec. 31, 1927:
> 7½ p.ct. on £120,000 redeemable preference stock,
> 5 p.ct. on £403,100 maximum dividend stock,
> 7 p.ct. on £787,560 sliding-scale stock,
> making with the interim dividends declared by the Directors and paid on Sept. 1, dividends for the year at the respective rates of 7½, 5, and 6¾ p.ct., be now declared and payable on March 1."

Mr. HENRY WOODALL, J.P., M.Inst.C.E., in seconding, remarked that from what the Chairman had said it would have been seen that the dividends proposed had been more than earned; and he was sure the meeting would approve them. The proprietors generally allowed him this opportunity of saying a few words about the works. They were, as usual, in first-class condition, and the results obtained from them were excellent. It was with a feeling of sadness that he could

no longer speak of their old friend Mr. Caddick as Engineer. He served them well for 28 years; and, as the Chairman had told them, he had recently retired under doctor's orders. Might he long enjoy his well-earned rest, which would be the happier for the knowledge that he handed over to his successor fine works in excellent condition. Their new Engineer, Mr. Grogono, was a young man of energy and ability. He had had unusual opportunities, of which he had taken full advantage. For 23 years he was with their rather larger neighbour, the Gas Light and Coke Company, where he had been in touch with the very best and most modern gas-works practice and engineering. With additions and improvements Mr. Grogono was making at Waddon, they could confidently expect that the good results obtained in the past would be bettered in the future.

The motion was agreed to.

Re-Elections and Directors' Remuneration.

The retiring Directors (Messrs. Charles Hussey and Harold Williams) were re-elected—one on the proposition of the CHAIRMAN, seconded by Mr. PERCY H. HALL, J.P., and the other on the motion of the CHAIRMAN, seconded by Mr. GUY SAVORY.

Mr. HUSSEY, returning thanks, said it might be of interest to some of those present to know that he was first elected to the Board in 1890, so that his service as a Director extended to 38 years. The capital issued in 1890 was £214,919; to-day they had reached nearly £1,700,000, and he knew they would feel that all this money had been spent in the best interests of the Company. The profit in the former year was £40,000; and this had now grown to £834,761.

The retiring Auditor (Mr. Frederick S. Sloman, F.C.A.) was re-appointed, on the proposition of Mr. C. A. MORGAN, seconded by Mr. A. H. PAGE.

Mr. HENRY WOODALL said it was with great pleasure that he rose to propose: "That as from Jan. 1, 1928, the remuneration of the Directors be increased by £400 per annum, to be divided among them as they may from time to time determine." Resolutions of this sort were generally proposed from the proprietors' side of the table; but he thought they would agree that it was more fitting that this one should come direct from the Board. He was happier in proposing the resolution because it would in no way affect him personally, except that it would give him much pleasure to see it passed. The small addition which they asked should be made to the fees would be used only for the increased remuneration of the Chairman and Deputy-Chairman. Both these gentlemen lived in the Company's area of supply, and were always at the call of the officials in case their advice was needed. He was sure they would all agree that they were particularly fortunate in their Chairman, Mr. Cash. He stood at the head of his profession, and for two years held the highest position in it—namely, the Presidency of the Institute of Chartered Accountants. His name was a household word in the gas industry. When gas companies promoted Bills in Parliament, their first thought was to retain Mr. Cash; and they breathed a sigh of relief if they found he had not been already retained by the other side. Mr. Cash not only put his great financial knowledge at the disposal of the Company, but he did everything in his power to promote the very happy relations which existed to-day between all classes—Directors, staff, and workmen. He must not detain them by telling them of Mr. Cash's many merits; but it was rather an anomaly that, although one could speak of Cash in these terms, one could not speak of these terms in cash. These services were invaluable. Then with regard to their Deputy-Chairman (to whom their sympathies went out that day), he had been on the Board for 38 years. He was Chairman of the Finance Committee; and his wise judgment and sane sympathy were of the greatest value. He was a delightful colleague. They would all, he (Mr. Woodall) was sure, agree with the Board in their desire to show, in the only way they could, their appreciation of the great services these gentlemen rendered to the Company.

Mr. HUSSEY, in seconding the resolution, heartily endorsed every word Mr. Woodall had uttered.

The proposition was heartily agreed to, and the CHAIRMAN returned thanks.

Vote of Thanks.

The CHAIRMAN said he had just one more thing to do, and that was to ask the proprietors to join with the Directors in an expression of thanks to the officers, staff, and workmen for their efficient services during the past year. From highest to lowest, they were excellently served. During the Christmas season there had been a very trying time; but everyone, both in the works and on the district, manfully stuck to his task, without murmur or trouble of any description. This he put down to the spirit of unity and co-operation existing, coupled with the co-partnership system and the example set by the officers. All the officers had the welfare of the men at heart, and were keen on their job themselves. This was why they had good service right through.

Mr. HARRY HALL seconded the vote, remarking that there was a very nice spirit among all the employees of the Croydon Gas Company. Courtesy and attention were to be met with at any of their offices. He expressed his great admiration of the new showrooms at Purley. The Chairman's advice to hold on to their gas investments was good.

The vote having been carried with applause,

Mr. W. J. SANDEMAN (General Manager) said this was the first occasion during his 24 years' service with the Company on which he had had the privilege of speaking on behalf of the whole of the employees; and on their behalf he wished to thank those present very heartily for their kind vote. The Company had a most loyal and efficient staff; and it was due in no small measure to their efforts that it had been possible to submit so good a report that day. He thanked the Chairman for his kind remarks regarding himself, and concluded by declaring that all were proud of serving the Croydon Gas Company, and meant to keep it in the position it now occupied—that of being second to none in the country.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

ANNUAL GENERAL MEETING.

The Annual General Meeting of the Company was held on Tuesday, Feb. 21, at the Offices, No. 639, High Road, Tottenham—Mr. HENRY WOODALL, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. E. J. K. Fussell, F.C.I.S.) read the notice convening the meeting; and the Directors' report and the statement of accounts for the year ended Dec. 31, 1927, were taken as read.

The CHAIRMAN, on rising to move the adoption of the report and accounts, said: Ladies and Gentlemen,—After the troubles and anxieties of 1926, the year 1927 has been comparatively smooth-running; and I am glad to be able to put before you satisfactory accounts. Shortly, the result of the year's working is that, after payment of the full statutory dividends at an increased rate of ½ p.ct. for the last half-year, and adding £1000 to the Electricity Renewal Fund, we are able to increase the carry forward by £4890; and it now stands at the substantial sum of £42,445.

Price of Gas Down.

At the commencement of the year the price of gas was 10d. per therm. This was reduced during the year to 9·4d., which is 0·6d. per therm, or 3d. per 1000 c.ft., less than at the commencement of the coal stoppage. The price is now 9d. per therm—the lowest price since the new system of charge came into operation. Bearing these reductions in mind, I hope you will agree that it is satisfactory to find we have been able to increase the carry forward to a greater extent than we had to reduce it last year. The increase in the sale of gas over last year is 4·66 p.ct., or 142 million c.ft. The increase in capital expenditure (gas) during the same period was £34,486; so that the cost per million c.ft. of increase was only £165. The capital per million c.ft. for the whole of the gas undertaking was £497 in 1926; and it is now £469. In a growing concern like ours, it is essential to see that the growth is not too dearly bought; and this is a mattter to which your Directors and the officials give special attention. I think it well to remind the proprietors that the 6 p.ct. redeemable mortgages, amounting to £70,000, are due for repayment on July 1 next.

The cost of coal last year was 9s. a ton less than for 1926; and we also obtained good prices for our residuals. This year there will be a further reduction in coal; but residuals are not doing so well, and it is doubtful if, in this year, our figure for net coal—which is the one that matters—will show any reduction on 1927.

Satisfactory Working Results.

I am glad to report that our working results are quite satisfactory, and show an improvement on 1926; and we expect, with the alterations and additions we are making in our plant, to obtain even better results this year. We have recently purchased premises in Palmers Green for a new showroom. Alterations necessary are in hand; and it will shortly be open to the public. We now have nine showrooms in our district; and all our showrooms have stores attached to them, and provision for fitters' carts. Good business is done in the sale of apparatus. Consumers find it useful to have near at hand places where they can purchase goods and obtain attention to complaints, and where they can pay accounts. We find much walking time is saved by fitters; they being able to keep their tools, and get necessary material, near to their work. The showrooms are all in good centres, and are in every way a valuable asset.

Growth of Business.

The growth of our business is regular, and approximates to 5 p.ct. per annum. This is partly due to the growth of the district, and partly to the increased use of appliances by existing consumers. I have had a careful estimate made, and find that during the last four years, out of the 500 million c.ft. increase in that period, 150 million c.ft. is due to increased consumption by existing consumers. This shows that year by year new uses are found for gas, and its convenience is being more fully recognized by our consumers. A short time ago I was shown two photographs—one of a tiny baby being kept alive in a sort of incubator heated by gas, and the other of a crematorium also gas fired. So that you see that gas is used literally from the cradle to the grave. [Laughter.]

Perhaps the 5 p.ct. compound increase to which I have just referred does not appear very rapid; but in the last four years the increase has been over 500 million c.ft., and is equal to the whole annual requirements of the town of Margate. It also means that we double our output in fourteen years. When one goes over our large works and knows that another as big will have to be provided in fourteen years' time, one realizes the responsibility of the position. Fortunately, in years past, your Directors, with wise forethought, purchased splendid sites for extension both at Willoughby Lane and Ponders End. So we are happily situated, as it is most difficult and costly to find, and obtain to-day, such large areas as are necessary for gas-works purposes. Many of you know that we have re-opened the Ponders End Works. They have been thoroughly modernized, and the results we are obtaining there are quite satisfactory. We are also glad to be again employing labour in this district.

Electricity.

Our output of electricity still grows rapidly. The increase this

year over last is 23 p.ct.; and in spite of a reduction in price, the profit is greater than in 1926 by £4310.

CO-PARTNERSHIP AND PENSION FUNDS.

You will notice that our contributions to these funds are increasing. Co-partnership is now costing us £551, and the pension fund £672, more than in 1926. This is all to the good. The balance standing to the credit of the pension fund is £134,317. Of this sum, approximately one-half (the contributions of the co-partners) is invested in securities outside the Company. The staff and employees are appreciating more and more the value of the pension fund. The fund was started in 1914, and became operative in 1924. The total number of pensioners is now 40.

PARLIAMENTARY BILL.

You will have noticed from the report that a Bill has been deposited in Parliament for the transfer to this Company of the Waltham and Cheshunt Gas Company, and for other purposes. An extraordinary meeting will follow this meeting, when the details of the Bill will be given you. The Waltham Company's district adjoins ours. The output of the Waltham Company is now 112 million c.ft. per annum, or only 3½ p.ct. of ours. The district, however, is a large one, and will no doubt develop, as all districts near London are doing. We believe we can show Parliament that the transfer will be to the benefit of all concerned—of consumers in our area, as well as consumers in the Waltham area. There will also be a small advantage to the shareholders.

There is one provision in the Bill which I will mention—namely, the conversion of our "A" consolidated ordinary stock. The "A" stock is to be converted into "B" stock; and from the date of transfer the "B" stock will be known and described as ordinary stock. You will appreciate the advantage of having only one ordinary stock, instead of two, as at present. The result, as far as the amount of return to the owners of the existing "A" and "B" stocks are concerned, will not vary in any way. The only difference will be that a small amount of the holding of "A" stockholders will be of a preferential character, and to that extent it may be said that they will have a slight advantage in added security; but they will receive no addition to income as a result of the change. There are several precedents for the proposal.

In conclusion, I would like to say that the good understanding between Directors, staff, and workpeople continues; and it is largely due to this that I am able to put the good results I have done before you. I now beg to move:

> "That the report of the Directors and statement of accounts for the year to Dec. 31, 1927, be received and adopted; and that the report be entered on the minutes of the proceedings of this day."

The DEPUTY-CHAIRMAN (Mr. Henry Bailey) formally seconded the resolution, which was carried unanimously without discussion.

DIVIDEND RECOMMENDATION.

The DEPUTY-CHAIRMAN next proposed:

> "That the dividends paid on Aug. 11, 1927, in respect of the half-year ended June 30, at the rate of 5½ and 5 p.ct. per annum on the preference stocks, 7¾ p.ct. per annum on the 'A' stock, and 6¼ p.ct. per annum on the 'B' stock, all less income-tax, be and are hereby confirmed.
>
> "That a dividend at the rate of 5½ p.ct. and 5 p.ct. per annum on the preference stocks, 7¾ p.ct. per annum on the 'A' stock, and 6¼ p.ct. per annum on the 'B' stock, all less income-tax, be declared for the half-year ended Dec. 31, 1927, payable on and after Feb. 28 next, and that the dividend warrants be sent to the proprietors by post."

He said he thought they might congratulate themselves upon having been able to increase the dividend slightly for the past half-year.

Mr. W. A. SURRIDGE seconded the motion, which was agreed to.

RE-ELECTIONS AND THANKS.

Mr. G. HAY MORGAN, K.C., B.Sc., proposing the re-election as a Director of Mr. Henry Woodall, remarked that everyone connected with the Company had the very highest opinion of their Chairman's abilities, and this opinion of him was entertained generally throughout the gas profession.

Mr. A. E. BROADBERRY, M.Inst.C.E., seconded the proposal, which was carried.

The CHAIRMAN moved the re-election as a Director of Mr. Arthur E. Broadberry. He pointed out that there was no need whatever to say anything to commend this proposal to the proprietors. Mr. Broadberry had been connected with the Tottenham Company for a great many years. He (the speaker) could not quite remember how many years it was; but however long the period might be, they all hoped it would be very much longer before they had to part with Mr. Broadberry.

Mr. THOMAS GOULDEN, M.Inst.C.E., seconded the resolution, which was agreed to.

Mr. BROADBERRY, in acknowledgment, mentioned that it was over 49 years ago that he entered the service of the Company.

Mr. SANDELL moved that Mr. William Cash, jun., be re-appointed an Auditor of the Company. He reminded the proprietors that a year ago they had the pleasure of electing Mr. Cash to succeed his father; and it was gratifying to know that he had not found it necessary to make any startling innovation in the accounts. The accounts had, in his (the speaker's) opinion been for many years a model of clearness and conciseness.

Dr. SCOTT seconded this; and it was agreed to.

Mr. E. L. BURTON proposed that the best thanks of the proprietors be given to the Chairman, Directors, and Auditors, and also to the officers, staffs, and workmen, for their services to the Company during the past year. He said the proprietors were extremely fortunate in having such a Board to conduct the affairs of the undertaking. The administration of a gas company called for something more than mere business knowledge. It was an expert business; and it should, at least in part, be managed, as the Tottenham Company was, by experts. In their Directors, they had a body of experts second to none in the country. For the excellent accounts that had been presented that day, their thanks were due to them, and also to the officers, staff, and workmen. Success depended in an undertaking such as theirs, not only upon one or even half-a-dozen persons, but upon every individual, from top to bottom, who took part in carrying on the work.

Dr. HAROLD G. COLMAN seconded the vote, remarking that he had known the works well for the last 25 years.

The vote having been carried by acclamation,

The CHAIRMAN returned thanks, saying that the Tottenham Company was a very pleasant one to serve. The relations between employers and employed were extremely cordial. The comfort and convenience of the workers were, as he was quite sure the employers would wish them to be, very carefully considered—["Hear, hear"]—and doubtless it was largely because of this that the work was so efficiently done. The proprietors would be pleased to hear that their capable Engineer, Mr. Smith, had recently been elected a Member of the Institution of Civil Engineers. He might say that the letters "M.I.C.E." were not obtained merely by payment of a subscription. [Laughter.] They did indicate merit. With regard to Mr. Fussell, he had lately had a tremendous lot of extra work thrust upon him; but the harder he worked, the better he seemed to be.

Mr. HAROLD C. SMITH (Chief Engineer), acknowledging the vote on behalf of the technical staff and workpeople, agreed with Mr. Burton that to attain success it was necessary that all should pull together. This is what they did in the Tottenham Company. Both staff and workpeople felt that they had a real share in the Company, and were out the whole time to do the best they could for the business.

Mr. FUSSELL, acknowledging the vote on behalf of his staff, remarked that as the years rolled by he became more and more proud of being associated with this vast undertaking. The figures quoted by the Chairman with reference to the growth of the business were really very impressive. He felt no fear at all as to the future of the Company.

EXTRAORDINARY MEETING.

The CHAIRMAN said this concluded the business of the ordinary meeting and they would now proceed to the extraordinary meeting, which was for the purpose of considering the provisions of a Bill now before Parliament to provide for the transfer to the Company of the undertaking of the Waltham and Cheshunt Gas Company, and for other purposes. He would ask Mr. Swallow to explain the provisions of the Bill. Before doing this, however, he would like to say how pleased he was to see with them that day Mr. Burton (who was the Chairman of the Waltham and Cheshunt Gas Company), and to thank him and his colleagues for the whole-hearted manner in which they had met the Tottenham Directors, and for the very pleasant negotiations they had had over this matter.

PROPOSED ACQUISITION OF THE UNDERTAKING OF THE WALTHAM AND CHESHUNT GAS COMPANY.

Mr. H. E. SWALLOW (of Messrs. Lees & Co.) said that the main object of the Bill was to provide for the transfer to the Tottenham Company of the undertaking of the Waltham and Cheshunt Gas Company. The terms of the transfer, financially and otherwise, were entirely agreed between the two Companies. The policy of amalgamation had for many years past been approved generally, not only in gas undertakings, but in many concerns connected with public utility services; and undoubtedly the results were advantageous. The aim of the Directors of both Companies had been to preserve as far as possible the financial return which the proprietors received. That was to say that in exchange for the Waltham ordinary stocks, the Bill proposed that there should be transferred practically an equivalent of Tottenham "B" stock, the name of which after the Bill passed would be "Ordinary Stock." In addition, pound for pound, there would be exchanged for the Waltham debenture stock debenture stock on exactly the same terms of the Tottenham Company. The effect of the Bill, if passed in the present form, would be to increase the Tottenham Company's capital by very nearly £100,000, that being the amount of Tottenham stock which was to be issued in exchange to the holders of the Waltham ordinary and debenture stocks. Other proposals of the Bill were, first, to transfer to the Tottenham Company not only the right of supplying gas within the limits of the Waltham Company, but also to exercise the unexercised capital powers of the Waltham Company. The amount of those powers was very nearly £80,000. The prices charged to consumers in the Waltham limits were higher than those in the Tottenham area; and the Bill proposed that there should be a differential charge in Waltham and Cheshunt of 4d. per therm for the first ten years, and 3d. after that period.

OTHER PROPOSALS.

Then it was proposed to change the name of the Company from the Tottenham District Light, Heat, and Power Company to the Tottenham and District Gas Company. Another proposal was to put the Tottenham "A" and "B" stocks on the same relative basis, by issuing £100 of "B" stock entitled to 3½ p.ct. and £30 of 5 p.ct. preference stock in exchange for each £100 of "A" stock entitled to 5 p.ct. In all stages of the sliding-scale the yield would be exactly the same. It was proposed to increase the Company's nominal ordinary capital by £200,000. This was based on estimates prepared by the Engineer as to the immediate future capital requirements of the Company. In addition, it was desired to raise the proportion of borrowed money to the ordinary and preference capital. Before the war, the proportion of borrowed money to ordinary capital was one-third; but since that time Parliament invariably, in the case of gas companies, had increased the amount to one-half of the ordinary and preference capital. The effect of this would be to give the Company additional capital powers exercisable by borrowing up to £456,000, if the amount of ordinary and preference capital issued permitted.

CAPITAL RESERVE FUND

With regard to a proposal in the Bill to constitute a Capital Re-

serve Fund, the underlying principle was that there were times when the amount standing to the credit of the Company's carry-forward was insufficient to permit of a reduction of the price of gas by ¼d. per therm, which was agreed to be the least amount by which one could alter the price of gas. In such a case, the Directors were asking that they might be given power to allocate up to £5000 in a half-year towards outlay which might be treated as capital expenditure. This sum was less than the amount which would be needed to reduce the price of gas in the next following half-year by ¼d. per therm. This would, of course, appeal to the proprietors as a most desirable proposal. It would have the effect of reducing the burden of interest, which played a very large part in the cost of gas. The proposal was only a step in the right direction. While the position of the consumer was not materially different, it was to the advantage of the undertaking as a whole that a small proportion of the capital expenditure of the Company should be charged to revenue rather than be met by the issue of further stock.

The CHAIRMAN said he thought Mr. Swallow had put before them all the important points of the Bill. It was an ordinary Bill, except with regard to the last-mentioned provision, which he hoped they would be able to persuade Parliament was a reasonable and proper one. He moved that the Bill be approved.

The DEPUTY-CHAIRMAN seconded this, and it was carried unanimously.

BOURNEMOUTH GAS AND WATER COMPANY.

ORDINARY AND EXTRAORDINARY GENERAL MEETINGS.

The Ordinary General Meeting of the Company was held on Friday, Feb. 24, at the London Offices, No. 48, Copthall Avenue, E.C.—Mr. WILLIAM CASH, J.P., F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the last annual meeting; and the Directors' report and the statement of accounts for the year ended Dec. 31 last were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he did not think he need detain the shareholders very long with the latter, because he had little doubt that they would be regarded as entirely satisfactory from the point of view of the proprietors. He would, however, like to offer one or two observations upon, and explanations of, the figures. On capital account a considerable sum of money had been spent during the year. So far as the gas undertaking was concerned, the largest part of this expenditure had been in connection with the new gasholder at the Bourne Valley Works, the provision of naphthalene washing plant at Poole, and additional carburetted water gas plant and purifiers. On the water side of the business, the principal outlay had been on high-pressure filters at the Longham pumping station. There had also been expenditure on the new showrooms, which had been finished and occupied. It was agreed, he thought, by all who had seen them that these were complete and first-rate premises. There was a credit for the sale of the old premises which they had occupied for so many years at Poole Hill, and which had become too small for their requirements.

GAS SALES UP 6½ P.CT.

As to the business done during the year, the sales of gas, as was mentioned in the report, had been 6·44 p.ct. more than in 1926, which he felt sure would be regarded as extremely satisfactory. The increased quantity sold was over 132½ million c.ft., which was a very substantial addition to their output. In fact, it constituted in itself almost the entire business of a small undertaking. The increased receipts, at an average price for the whole period of about the same as in 1926, amounted to nearly £30,000. The return from residuals was a little better; the reason being that they had an advantage in the early part of 1927 as a consequence of the price of fuel generally being high on account of the coal stoppage. The profit on fittings was not quite so much as in the previous year—mainly, he thought, because in 1926 there was a great rush of consumers to secure gas appliances owing to the fact that they were unable to obtain coal.

Summarizing the results on the water side of the business, he might say that the receipts were up to the extent of £2734, which was an increase of nearly 3½ p.ct., though it was interesting to observe that the quantity of water supplied showed a considerably greater increase than this. It was a little difficult to compare results with 1926, though the figures were given in the printed accounts, because the two half-years had varied very considerably. As the shareholders would remember, in 1927, the Company had to bring into account some high-priced coal; but, as he had already mentioned, they obtained high prices for residuals in the first half of the year.

GRATIFYING RESULTS.

Summing-up the whole position, he thought all would feel that they were justified in congratulating themselves upon the results, because, if they turned to the profit and loss account, they would see that the Directors were this year placing £10,000 to reserve, and were also putting a similar amount to the pensions fund; while they were carrying forward the satisfactory sum of £31,000 more than they brought into account. But it was only fair to remember, in this connection, that in 1926 they drew upon their carry forward to a very substantial extent. Whereas in 1926 the sum brought in was £31,652, there was carried forward into 1927 only £20,083. In other words, in 1926, they drew upon their carry forward to the extent of £11,000. They had, however, made good all that they took out of the carry forward in 1926, by adding a rather larger sum in 1927. As to the allocation to the pension fund, he might say that they had had this fund valued by their Actuary, as they did at intervals, and he had advised them that the pension fund needed strengthening. As the proprietors were aware, this fund was guaranteed by the Company; and on this occasion they would find in the gas revenue account and in the water revenue account that the Company's ordinary contribution had been substantially increased. There was no special allocation appearing in the revenue account, as a year ago, when they took £5000 direct from revenue; but revenue had borne an increased allocation, and they had thought it wise to take £10,000 out of the profit and loss account to strengthen this fund. Their Actuary had told them there was little doubt they would have to make greater contributions for some time to come. This was due to two things. The first was the age of entrants when the fund was formed, and the second was that the contributions in the earlier years were based upon the wages then ruling, whereas the pensions had to be calculated upon the wages received at the time of retirement—and wages, of course, had gone up heavily.

REDUCTIONS IN THE PRICE OF GAS.

As would be seen from the accounts, the Company had enjoyed a very successful year, and the gas profit was very much more than in 1926. It had, however, to be remembered that they were comparing a very good with a very bad year. The Directors had endeavoured to protect the position of the consumer, and had continuously reduced the price of gas. On Jan. 1, 1927, it was 10·6d. per therm. This was reduced on April 1 to 10d., on July 1 to 9·5d. (which was the pre-strike price), on Jan. 1 this year to 9·2d., and from April 1 next it was coming down again to 9d. per therm, which, he thought, was a very reasonable price for a place like Bournemouth.

Now, as to the competition of electricity. If they compared the total quantity of gas sold in 1927 with the figure for 1926, they would notice that, while the total sales of gas, expressed in cubic feet, had gone up 132 millions, the increased business on a heat unit basis amounted to 597,000 therms. Now, taking 30 units of electricity as equalling 1 therm of gas, this represented an increase of nearly 18,000,000 electrical units. When he told them that the very successful Bournemouth and Poole Electricity Company sold in 1926 some 10,500,000 units, they would recognize the astonishing fact that the increased gas sale in one year was more than the total output of the Electricity Company, expressed on a heat unit basis. Well, the latter were a flourishing Company, paying good dividends; but the capital was relatively very much higher than that of their own Company. This condition prevailed throughout the industry, and was reassuring to gas undertakings when considering the question of competition. The real cost of electricity was not in coal and the generation of current, but in the transmission and the proportionately high cost of capital. Their own particular Company enjoyed the benefit of a very low capital charge. In other words, the shareholders who subscribed money for this Company had paid-over such large premiums that the average return to the shareholder was only a very little more than 5½ p.ct., and on the share and loan capital combined it was just under this figure. This enabled them to furnish their commodities on very reasonable terms to the consumers.

SOME INTERESTING FIGURES.

As time went on, the heat value of gas was becoming more and more important, because it was now very extensively used for heating and cooking. Particularly in a place like Bournemouth, it was utilized to an enormous extent in hotels and boarding-houses. In their advertisements, these establishments made a special feature of the fact that there were gas fires in every bedroom. These appliances were put in by the hundred throughout Bournemouth. The record day's output of the Company last year reached just over 11 million c.ft., during the very cold weather in December. Their showroom sales were well maintained; and the total sales of cookers, gas fires, and water heaters last year came to nearly £55,000. Another interesting matter to which he would like to draw their attention was that during 1927 there were 1736 new houses completed in Bournemouth, of which 938 were piped for gas only. The Company were aware of no houses in which there was only electricity; but there were 798 in which there were both pipes and wires. This, he thought, was great testimony to the activity of their distribution department and their canvassers.

THE WATER DEPARTMENT.

Turning to the water side of the business, the proprietors would have noticed that they were going to be asked to approve of a Bill which was being promoted in Parliament. So far as the local authorities were concerned, there might be minor points raised; but at any rate in the First House they were not opposing. The Company always tried to work in amity with these bodies, and he thought the Directors had satisfied them that what was proposed was only right and reasonable. The main objects of the Bill were to secure confirmation of existing works, principally at Longham, and to obtain additional powers enabling them to take water from the River Stour at Longham, further capital powers, and a small extension of the limits of supply of gas. The Company were under statutory obligation to supply Bournemouth with pure and wholesome water. This was a matter of the greatest possible importance in a health centre such as theirs; and the Company had left nothing undone to ensure a supply to which no exception could be taken, on the ground either of quality or of quantity. Mechanical filters had been installed; and they were dealing by chlorination and de-chlorination methods with the water supplied to-day. It also passed through sand filters, and was most carefully watched by their own chemists and outside advisers—and, of course, by the Corporation. The policy which the

Directors had consistently followed from the earliest days would be continued; and he believed these proposals were a step towards providing the additional water required by the growth of Bournemouth by the best-known methods, and with the greatest security to the consumers. So far as the shareholders were concerned, the accounts which he now asked them to approve were very satisfactory ones.

The DEPUTY-CHAIRMAN (Sir Charles L. Morgan, C.B.E., M.Inst.C.E.) seconded the motion, which was carried unanimously without discussion.

DIVIDEND AND RE-ELECTIONS.

An interim dividend at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8¾ p.ct. on the original shares was paid for the half-year to June last; and on the proposition of the CHAIRMAN, seconded by Sir CHARLES J. JESSEL, Bart., a dividend at the same rates for the second half-year was declared.

The CHAIRMAN proposed the re-election as a Director of Lieut.-Col. Harold W. Woodall, C.I.E., M.Inst.C.E., who, he said, was at one period their able Engineer and General Manager at Bournemouth, and had been a Director of the Company for some considerable time. His great experience and ability were of the utmost assistance to the Board.

Mr. E. HONORATUS LLOYD, K.C., seconded the motion, which was agreed to.

The CHAIRMAN said that unhappily one of the Auditors, Mr. Lewis Hardy, F.C.A., had died. He was a man of ability, and had served the Company well in this capacity since 1922. Originally there were two candidates for the vacancy thus created; but one of them, Mr. R. T. Cuff, F.C.A., had retired, and thus left only Mr. W. B. Paton, A.C.A., who had been Mr. Hardy's partner.

Mr. Paton was appointed an Auditor, on the proposition of Mr. HYDE BURTON, seconded by Mr. R. H. GLEN, F.C.A.; and it was resolved that, as the whole of the work of the audit for the half-year to December had fallen upon Mr. Glen, he should be paid, in addition to his usual remuneration, the amount which would have gone to the second Auditor, had there been one.

CAPITAL MATTERS.

The CHAIRMAN next moved a series of lengthy resolutions authorizing the Directors from time to time as they think fit to issue the remaining capital, and for this purpose rescinding resolutions previously passed sanctioning some of it. He pointed out that the business was growing at a most extraordinary rate, and that in the last ten years they had spent some £700,000. The sums now to be sanctioned would not therefore last them very long.

The DEPUTY-CHAIRMAN seconded the resolutions, and they were carried unanimously.

VOTE OF THANKS.

The CHAIRMAN proposed a hearty vote of thanks to the officers, staff, and workpeople. They had, he said, passed through a busy year, and had passed through it well. The General Manager told him that there was nothing but good to report of the workpeople, who therefore deserved their warmest thanks. The staffs, in both London and Bournemouth, had done their very best.

Mr. PATON seconded the vote, which was cordially passed.

Mr. PHILIP G. G. MOON, F.C.S. (Engineer and General Manager), in responding, said that, thanks to the co-partnership scheme, most of their people at Bournemouth were shareholders in the Company, and therefore would see the report of that meeting, which they would read with considerable interest. They always appreciated these votes. All were imbued with a confident feeling that, in spite of the super-electric schemes, there was a wonderful future for gas. Further, he was quite sure that every one of their people, from the youngest fitter's mate right up through the whole staff, felt a very definite pride, though a modest pride, in serving the Company. They were not only proud of the industry, but they were particularly proud of the Company; and animated by such a spirit, they were bound to do—as, in fact, they did—very good work. That they were imbued with this spirit was due entirely to the broad and enlightened policy which the Directors had at all times pursued, not only towards the consumers and the shareholders, but also towards the workers.

EXTRAORDINARY GENERAL MEETING.

The CHAIRMAN said this concluded the business of the ordinary meeting, and he declared the meeting an extraordinary one, for the purpose of considering the Bill of the Company now before Parliament. He briefly went through the clauses of the Bill, explaining the main points. In the proposed extension of the limits of gas supply, he said, they would not be interfering with anybody else's area, and it was desirable that there should be a supply of gas available. Power was taken to raise £400,000 of new capital, with authority to borrow up to one-half of the amount issued. The really important part of the Bill was that which would enable them to take water direct from the River Stour.

The Bill was approved, on the motion of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN.

The proceedings were brought to a close with a cordial vote of thanks to the Chairman and Directors.

THE WORKING OF GLASGOW GAS DEPARTMENT.

Mr. McLusky Replies to Criticism.

In the "Glasgow Herald" for Feb. 20 was published a statement by Mr. J. W. McLusky, General Manager of the Glasgow Corporation Gas Department, in reply to a critical analysis of the accounts of the city's gas undertaking which appeared in the "Glasgow Herald" for Feb. 17. The following is the text of Mr. McLusky's reply:

CAPITAL EXPENDITURE.

The amount of capital expenditure in the past six years is correctly stated by the writer of the article, and works out on an average at £387,000 per annum.

This is not an unreasonable sum for the reconstruction of three large gas-works, the provision and laying of mains, services, meters, and appliances for new housing schemes, and the reconstruction of the chemical plant.

The production of gas per ton of coal during the past six years is as follows:

	C.Ft.
1922	12,155
1923	13,280
1924	13,590
1925	14,283
1926	14,354
1927	14,858

The sale of gas for all purposes in the city has increased very satisfactorily, as will be seen from the following figures:

Year.	Gas Sold in Thousands of Millions of C.Ft.
1922	7970
1923	8200
1924	8520
1925	8680
1926	9100

The net annual return from the Chemical Works to the Gas Department (that is, the sum available after all costs are deducted) has naturally fluctuated in accordance with markets, but it has been maintained at the very satisfactory average of £210,218 per annum. This sum is equal to 6d. per 1000 c.ft. on all gas sold.

MANUFACTURING STATIONS.

The writer of the article calls for a report on the gas manufacturing stations. This has been the subject of many reports, visits, and discussions; and the Gas Committee of to-day are familiar with the enormous advances that have been carried out in modernizing the stations. The following figures are drawn from the last report of the General Manager:

Capacity of Existing Plants.

[Production in Million C.Ft. per 24 hours.]

—	Modern.	Old.
Provan Works	18	6
Dawsholm Works	5	7
Dalmarnock Works	7	Demolished
Tradeston Works	3	4
Water gas plants	5	*Nil*
Total daily production	38	17

The highest day's sale of gas on record is 43 million c.ft., and the lowest is 19 millions. This reveals the margin of demand between winter and summer, and indicates the amount of plant which must be maintained in good condition against the rising demand in winter.

PRODUCTION COSTS.

The undernoted figures illustrate the advantage of manufacturing gas in the new installations:

Cost of Production (Present)—i.e., Total Cost into Gasholders.

—	Pence per 1000 C.Ft.	
	Modern.	Old.
Provan Works	13·76	Out of use
Dawsholm Works	14·85	25·29
Dalmarnock Works	16·41	Demolished
Tradeston Works	14·25	26·97

Up to and including this winter it has been necessary to bring into commission old and uneconomical plant to carry the Department through the peak months of winter. At the time of writing, the last bench of old retorts has been let down; and with the expected completion of modern plant in Dawsholm in September to produce nine million additional cubic feet per 24 hours, the necessity for using old plant automatically ceases.

During the past five years, while reconstruction of works has been pushed forward, there was the recurring financial handicap every winter of using supplementary plant, which increased the production costs by at least 1s. per 1000 c.ft., or an extra working cost of £500 per day over a period of approximately three months.

The addition of the new plant at Dawsholm will ensure that the

peak demand for gas will be adequately met without the help of the old plant, which will be due for scrapping after forty years' service.

The methods of handling coal and coke and carbonizing coals of varying characteristics in the new installations are the most modern that can be designed, and include the best ideas of any known installation. For example, the Provan retort house handles every day in winter 1200 tons of coal. This quantity is mechanically handled at a cost of ½d. per ton.

BORROWED MONEY.

The Department obtained powers under the Glasgow Corporation Order of 1921 to borrow a sum not exceeding £3,000,000 for necessary reconstruction and equipment. These powers were granted after a searching inquiry by special Commissioners.

The writer of the article is correct in stating that of the above sum there is still unexhausted a sum amounting to £880,668. His recommendation that "there must be a stop, temporarily at least, to further borrowing" will be heartily endorsed by the Gas Committee and the General Manager, as this was their exact finding after deciding on the final piece of reconstruction at Dawsholm Works.

It is safe to estimate that during the next five years there will be no cause for seeking further powers in this direction. In addition, with the steady decreasing tendency in the price of gas and the ability of the plant and equipment to deal with large increases in demand for gas at reduced costs of production, the standing charges will decrease each year relatively.

WELFARE GROUNDS—MAXWELL ROAD.

This is a popular subject for attack by certain critics of the Department, and the outlay has been estimated by people, who evidently have not had an opportunity to obtain reliable figures, at a cost far in excess of accuracy. The total cost to the Department for pavilion, recreation grounds, concrete wall and railing, and all contingencies amounted to £9466 9s. 9d. No cost whatever is incurred by the Department in running the welfare scheme. Apart from the capital outlay, the entire expenditure is met by the members, numbering upwards of 1200, who are all employees of the Department.

CONSUMERS' APPLIANCES.

The scheme for the maintenance of consumers' appliances was inaugurated about five years ago, first as an experiment in a restricted area, and later extended gradually to the entire area of supply. The total cost to the gas consumers for this service is slightly under ½d. per 1000 c.ft. purchased over the entire period. This special service has removed causes for complaint in every district at a very low cost, and has undoubtedly increased and popularized the use of gas for all domestic purposes.

GAS COMPANIES' RESULTS FOR 1927.

BRISTOL.

Presiding at the Annual Meeting of the Bristol Gas Company, Mr. J. FULLER EBERLE, Deputy-Chairman, expressed the regret of the Directors at the death in April last of Mr. Fenwick Richards, who was a Director for 31 years, and occupied the position of Chairman for five years up till 1918. His place on the Board had been filled by the election of Mr. Frederick Charles Burgess. Turning to the record of the past year, Mr. Eberle said it was gratifying that they could point to a further period of prosperity and increased business. The increased sale of gas during the year was 87 million c.ft., and the total quantity produced was 4090 millions, which was a record. The increase was reflected in the receipts, and gas sales amounted to £639,285—an increase over the previous year of £36,500. This was partly accounted for by the increased sales and partly by the increased price charged during the first two quarters, to make up for the enormously increased cost of coal during the latter half of 1926 in consequence of the coal strike. For the first half of the year, the price was increased to 9d. per therm, but the pre-strike price of 8d. per therm was resumed on July 1 last. The price would be still further reduced to 7½d. per therm (3s. per 1000 c.ft.) in the June quarter, and all gas consumed from April 1 would be charged at the new rate. This was equal to the lowest price charged since the war.

The total number of consumers was now 89,040—an increase of 3479—and the number of cookers on hire was 78,263, being an increase during the year of 3133. There had also been a record demand for gas fires and other appliances, while the use of gas in industry was steadily growing. As showing the satisfactory progress being made, he called attention to the fact that the number of consumers had increased by 10,543 in the last three years, with a corresponding increase in the number of cookers, which proved the general adoption of gas for cooking. As an indication of the extent to which gas was appreciated by domestic consumers, 48 p.ct. of the consumers were now supplied by prepayment meters, representing over 32 p.ct. of the total consumption. The Directors had just completed negotiations for the purchase of the Keynsham gas undertaking, and the Bristol supply would be connected during the summer. There was every prospect of considerable development in that district.

The relations between the Company and the employees had been of the most cordial character; and he took the opportunity of expressing appreciation of the efficient service given by the Secretary and Commercial Manager (Mr. S. E. Halliwell) and the Engineer and Works Manager (Mr. R. Robertson), who had been ably supported by the managers of the different works and the whole staff of the Company.

Continuing, Mr. Eberle said that the revenue profit was £112,198, and the balance carried forward to next year's account was £86,018.

Sir PERCY K. STOTHERT seconded, and the resolution was carried unanimously.

Mr. G. H. BOUCHER moved: That a dividend for the half-year ended Dec. 31 last at the rate of 5 p.ct. per annum, less tax, on the nominal capital of the Company entitled to dividend be declared.

Mr. F. C. BURGESS seconded, and the motion was accepted without dissent.

Upon the completion of the business of the ordinary meeting, an Extraordinary General Meeting was held for the purpose of authorizing the creation and issue of debenture stock (to the extent of £312,652) under the powers of the Bristol Gas Order, 1927. The resolution was put by the CHAIRMAN, and was carried unanimously.

BROMSGROVE.

At the annual meeting of the Bromsgrove Gaslight and Coke Company a disposable balance was reported of £3879. Dividends were declared for the year of 10 p.ct. on the original shares and 7 p.ct. on the "B" shares, both less tax, leaving £1737 to be carried forward to next year's accounts. The CHAIRMAN (Mr. J. Green) stated that the L.M. & S. Railway Company had decided to discontinue making their own gas at Bromsgrove Station, and had entered into a contract to take supplies from the Company. The price of gas was reduced 1s. per 1000 c.ft. last year, and further reductions would be made at the end of the June quarter.

CLEVELAND.

At the half-yearly meeting of the Cleveland Gas Company, held at Saltburn—Major E. HAMILTON, Chairman, presiding—a sum of £4206 was available for dividend, and a dividend of 3 p.ct. per annum was agreed to; £200 being added to the contingent fund and £3409 being carried forward.

GRAYS AND TILBURY.

Lt.-Col. F. E. BARTLETT, presiding at the annual meeting of the Grays and Tilbury Gas Company, held on Feb. 16, having referred to the great loss the Company had sustained by the death of Mr. G. C. King, who had been a Director for 24 years, said that the progress of the Company had been well maintained during 1927; the sales of gas having increased by 12·07 p.ct., and the number of consumers by 11·5 p.ct. Building development in the large area supplied by the Company had necessitated considerable capital expenditure on plant, mains, services, meters, and cookers. A new gasholder of 440,000 c.ft. capacity, costing £11,851, had been completed and put into use at Rayleigh, and a further sum of £10,600 on account of a new 1,500,000 c.ft. gasholder in course of erection upon the Company's new site at Grays was included in the expenditure upon new buildings, plant, &c. The capital expenditure account also included a figure of £7790; being the balance for the land and property acquired at Grays—a site which not only gave the Company ample room for further extensions, but also had the advantage of being contiguous to the existing works.

After providing for depreciation, and placing £2025 to the credit of the renewal fund, the gross revenue carried to the profit and loss account was £27,600. After meeting standing charges, including a further sum written-off debenture discount, the full costs of the issues of new shares, and the payment of interim dividends for the half-year ended June 30 last, the balance of net profit available for dividends had increased from £14,835 to £22,825—an increase of £7990. The carry-forward, after the payment of the proposed final dividends for the year, would be £17,064. Final dividends at the increased rates of £10 10s. p.ct. on the "A" shares and £7 7s. p.ct. on the "B" shares, making the average rates of dividend 10 p.ct. and 7 p.ct. for the year, were recommended. On the preference shares, a dividend of 6 p.ct. was recommended.

Mr. COURTENAY C. S. FOOKS (Deputy-Chairman) seconded the resolution, which was carried unanimously.

A hearty vote of thanks to the Directors, the Engineer (Mr. A. W. Sumner), the Secretary (Mr. Wm. F. Whittaker), and to the staff and workmen, was accorded on the motion of Mr. WM. RICHARDS, seconded by Mr. RAE P. NORMAND.

SUNDERLAND.

A reduction of 2d. per 1000 c.ft. was announced at the Annual Meeting of the Sunderland Gas Company. This operates as from the December meter readings, and makes the price 2s. 6d. per 1000 c.ft. for domestic purposes and 2s. 4d. for power, less the usual discounts in both cases. The CHAIRMAN (Mr. T. S. Short) said that for every 1000 c.ft. of gas sold, more than 2d. was paid out by the Company in rates and taxes. Moving the adoption of the annual report and accounts, he observed that the number of the Company's customers had increased during the year by 1350, and the total was now practically 50,000. Rates, taxes, and insurance accounted for £11,710, compared with £4853 in 1916. Receipts from the sales of gas amounted to £172,520, and from residuals £57,242—an increase of £10,038, due to better markets for coke and tar. The final result of the year's working was a balance of £34,570 carried to net revenue account; and after paying the final dividend, they proposed to carry forward £12,081 to next year's account. Altogether the year had been eminently satisfactory.

The report and balance-sheet were adopted, and a final dividend of 3 p.ct. was declared.

SWANSEA.

Presiding at the Annual Meeting of the Swansea Gas Light Company, held on Feb. 23, Mr. ERNEST H. LEEDER (the Chairman) said that the gross revenue expenditure had fallen from £186,933 to £165,828. This difference of £21,105 was largely accounted for by the cost of coal, which was lower to the extent of £16,507 than it was in the year of the coal strike. This enabled the Directors to remove at the end of the March quarter the temporary increase in the price of gas of 2d. per therm rendered necessary by the purchase of foreign and non-contract coals in 1926. Last year he had to inform them that the Swansea rates were 1s. 3d. in the pound more

than they were in 1925. This year he had to record a further increase of 6d. in the pound, which increase had raised the rates from £13,555 per annum to £15,355 per annum, at which figure they represented a charge on the price of gas equivalent to 1·16d. per therm, or 5·28d. per 1000 c.ft. of gas. Municipal and other local authorities should exercise the strictest possible economy. In common with many undertakings, the sales of gas in 1927 were slightly less than those of the previous year. The receipts from public lighting had been steadily diminishing of late years; this being due partly to the Swansea Corporation having introduced a principle of reduced public lighting during the summer months, and partly to the Corporation converting more and more public lamps from gas to electricity, which was supplied by their own Electricity Department. The receipts from residuals had fallen in common with the fall in coal prices. This particularly applied to coke, though the resumption to their normal practice with regard to the percentage of water gas made also had some bearing on these receipts.

The result of the year's working had been such that a gross profit of £61,261 had been carried to profit and loss account to meet capital charges of £54,654. The Directors have made suitable appropriations to the reserve fund, and to the co-partnership fund; but even after these appropriations there was an increase of over £2000 between the balance carried forward and the balance brought forward. He thought they could look forward to a trade revival with confidence. In the gas industry they were confidently looking forward to obtaining certain amending gas legislation which would enable them to work under conditions—both technical and financial—more in keeping with modern requirements, and they also anticipated a continuance, between themselves and their employees, of that spirit of co-operation and friendliness which had been characteristic of their relations for many years past. It was with this spirit of confidence that the Directors were facing the coming year; and as evidence they had decided to make an immediate reduction in the price of gas. As from the reading of the meter indices at the end of the March quarter, the price of gas to all consumers would be reduced by 0·4d. per therm.

The report and statement of accounts were unanimously adopted, and dividends at the rate of 7 p.ct. per annum on the redeemable preference stock and 5 p.ct. per annum on the ordinary stock were declared.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 27.

There is rather a better tone about the pitch market, and buyers are said to be raising their ideas of value; but the price is still quite nominal.

Creosote is steady at about 8¾d. per gallon.

Tar spirits are unchanged as follows: Pure benzole, 1s. 5d. to 1s. 6d. per gallon; pure toluole, about 1s. 10d per gallon; 95/160 solvent naphtha, 1s. 3d. per gallon; pyridine, about 6s. per gallon.

Tar Products in the Provinces.

Feb. 27.

Tar products generally are still quiet.

In pitch the market is steady, and there is rather more inquiry especially for near delivery.

The market for creosote is still firm, and prices are unaltered.

Carbolic crystals are quiet; but the price of crude remains unchanged.

Tar acids of all grades are in good demand.

Water-white products are still very quiet.

There is rather more inquiry for naphthalene.

The average prices of gas-works products during the week were: Gas-works tar, 44s. to 49s. Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 52s. 6d. to 55s.; Liverpool, 55s. to 57s. 6d.; Clyde, 57s. 6d. to 66s. Benzole, 90 p.ct., North, 11½d. to 1s. 0½d.; crude, 65 p.ct. at 120° C., 9d. to 9¼d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 3d. to 1s. 4d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 8¾d. to 9¼d. Heavy naphtha, North, 8¾d. to 9¼d. Creosote, in bulk, North, liquid, 7½d. to 7⅝d.; salty, 7⅜d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 3d. to 2s. 4d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

CONTRACTS OPEN.

Retorts.

The Urban District Council of Maryport invite tenders for the resetting of gas retorts. [See advert. on p. 577.]

Coal.

The Directors of the Chertsey Consumers' Gas Company invite tenders for the supply of coal. [See advert. on p. 557.]

Station Meter.

The Edinburgh Corporation Gas Department invite tenders for the supply, delivery, and erection of a station meter. [See advert. on p. 557.]

Price Reduction at Rochester.—The Directors of the Rochester, Chatham, and Gillingham Gas Company announce that the price of gas will be reduced by ¾d. per therm from the date of the ordinary meter readings for the quarter ended March 31. The new price will be 9·6d. per therm.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market is in a very dull condition, and there seems to be a serious shortage of new business for all classes of coal. In accordance with a more or less agreed policy, collieries continue to quote prices which were ruling before the recent arbitration awards; it being quite reasonably argued that wage reductions were given to assist the collieries towards a cost more in keeping with selling prices. Whether there really is a lull in export requirements just at this moment, or whether foreigners are adopting a deliberate policy of holding off in the hope that the reductions in cost will be passed on to them, there is at present a great falling-off in volume of trade. The prospect is that there will be considerable idle time in the near future if quotations are maintained. If collieries really do face up to this, it may be that foreigners will realize that business is meant, and will come in and buy. It is, however, extremely difficult to keep to "agreed" prices when production costs vary for each colliery, and, apart from this, much must depend upon what competitors can do in the open market.

Wear Special gas is quoted at 16s. f.o.b., and best qualities ask 15s. 3d. Seconds are 13s. to 13s. 9d., according to brand. Durham coking is weak, and, while some makes are nominally 13s. 9d., the poorer qualities are obtainable down to 13s. Demand for bunkers is slow, and best makes, while maintaining a quotation of 14s. 6d., are faced with shortage of trade. Northumberlands are quoting "agreed" minimum prices, from 13s. 6d. for best screened sorts downwards. But orders are very scarce, and second-hand holders are selling at lower figures. The demand for gas coke is quieter; but stocks are low, and 21s. 6d. f.o.b. is still asked for shipment.

YORKSHIRE AND LANCASHIRE.

Gas coals are moving freely, with indications of inquiries rather advanced as compared with previous years. This is probably due to the doubtful effect of the coal-marketing scheme now before the trade.

Industrial fuels have declined somewhat, the lower grades being rather free at the moment. Export moves slowly, with indications that the coal-marketing scheme may result in some orders being placed.

There is a slighter demand for best house coal; but secondary qualities are in better request for bagging purposes.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 15s. to 15s. 3d.; screened gas coal, 15s. 6d. to 16s.; washed trebles, 16s. to 16s. 3d.; washed doubles, 14s. 6d. to 14s. 9d.; washed singles, 14s. 6d. to 14s. 9d.; washed smalls, 11s. 3d. to 11s. 6d.; smithy peas, 17s. 6d. to 18s. 6d. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. 3d. to 15s.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 15s. 6d. to 16s.; washed doubles, 14s. 9d. to 15s.; washed singles, 14s. 3d. to 15s.; washed smalls, 11s. to 11s. 3d.; unwashed trebles, 14s. 9d. to 15s. 3d.; unwashed doubles, 10s. 9d. to 11s.; rough slack, 9s. 6d. to 10s.; coking smalls, 9s. to 9s. 6d. per ton.

Derbyshire and Nottinghamshire—Top hards, 15s. to 16s.; washed trebles, 15s. 6d. to 16s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 11s. to 11s. 6d.; rough slack, 9s. 9d. to 10s. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. to 14s. 6d.; gas coke, 21s. 3d. to 24s. 3d.; furnace coke, 17s. 6d. to 18s. per ton.

Trade is quiet in Lancashire, all classes of coal being in poor demand. Quotations: Lancashire best house, 31s. to 32s.; seconds, 27s. to 28s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire selected house, 31s. to 33s.; house, 26s. to 28s.; cobbles, 18s. to 20s.; washed doubles, 13s. to 14s.; washed singles, 12s. to 13s. in wagons at pit.

MIDLANDS.

The market does not show much variation. With the reduction of stocks on wharves, rather larger orders have been put through for house coal. The difference has not been appreciable, however, except at pits where the proportion of house coal produced is unusually large. There has been no effect on prices, which continue weak and irregular, though nominally unaltered.

No improvement can be reported in the demand for industrial fuel. Conditions in the heavy trades are as adverse as they were a month or two ago. Circumstances which have caused a stiffening of the price for Durham coke have no counterpart in the Midlands at present. Blast-furnaces are so poorly employed that, notwithstanding curtailment of output at ovens, the coke consumptive demand still lags behind. Hard smelting cokes change hands round 12s. at the ovens.

Nevertheless, new factors are emerging which make the coke interests hopeful of an improvement south of the Tees before very long. Though British pig iron has not re-established a competitive position in some outside markets to which it formerly went, it is recovering the initiative in vulnerable quarters at home. It is thought, too, that the persistent abstention from buying of foundry iron is due to a combination of circumstances which will not tell so heavily as the spring advances. The abnormally wet weather, coinciding with the reduction of the house building subsidy, has checked the demand for light castings, and it is in this direction that the slump is mainly felt.

Chesterfield's Prepayment Meters.—The Borough Treasurer of Chesterfield, Mr. W. C. Coxall, in an address to members of the Sheffield and North-East Midlands Group of the Institute of Public Administration, said that the collectors of prepayment gas meters at Chesterfield handled 10¼ million coppers in a year, besides silver. On the average, one collector emptied 45 gas meters a day.

STOCK MARKET REPORT.

THE past week on the Stock Exchange would have been extremely quiet had it not been for the excitement over the Courtaulds' bonus announcement. The dealings, which were carried on at unusual hours, were on an unprecedented scale, and, notwithstanding the Company's warnings that the issue of share for share did not indicate that the profits in the aggregate would in the future be larger, it is confidently predicted that the price of the shares will reach £10. While other sections were overshadowed by the activity, there were a few bright spots. There was a steady upward trend among gilt-edged issues, and Funding Loan improved on a renewal of Continental buying. In the Foreign Market, interest was mainly centred in Chinese securities, particularly the 1912 loan. There was very little going on in the Home Rail Market, and prices were inclined to sag; but Oils were decidedly more interesting, although the dealings were mostly confined to professionals.

The Gas Market continued to display a firm tone. A further batch of accounts was received during the week, and, as anticipated, they show considerably increased profits compared with a year ago. Bournemouth, Eastbourne, East Hull, Hastings, Hornsey, Liverpool, Newcastle, Tynemouth, and Wandsworth Companies are paying the same rates of dividend as for 1926. The Brighton Company are recommending final dividends at the rates of £3 15s. and £3 7s. 6d. on the 6 p.ct. and 5 p.ct. consolidated stocks respectively, making £7 7s. p.ct. and £6 11s. 9d. p.ct. for the year. The Bournemouth, East Hull, and Newcastle Companies are proposing to raise further capital. It will be seen from the table that, apart from the usual *ex* div. reductions at this time of year, there were no changes of importance; but it is interesting to note that the Commercial Company's ordinary stock, although reaching 98-101 on Tuesday last, is now quoted *ex* div. at the same price as a week ago.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 97½, Cardiff 101, Commercial 100, Croydon sliding scale 103½, European 8½, 8⅝, Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 4½d., 3½ p.ct. maximum 62½, 4 p.ct. preference 78½, Imperial Continental 150, Newcastle and Gateshead 3½ p.ct. debenture 66, 67, Primitiva 20s. 7½d., 20s. 9d., 21s., South Metropolitan 106½, 106⅝, 107½, Swansea 7 p.ct. preference 104½, Tottenham "B" 93. Supplementary prices, Brighton and Hove 4 p.ct. debenture 77, Croydon 7½ p.ct. preference 104, Liverpool 5½ p.ct. 89½.

On Tuesday, Croydon sliding scale 104½, European 8⅝, Gas Light and Coke 19s. 1½d., 19s. 2½d., 19s. 3½d., 19s. 4d., 4 p.ct. preference 79½, 3 p.ct. debenture 60½, Imperial Continental 150, 151, Primitiva 20s. 7½d., 20s. 9d., 20s. 10½d., San Paulo 6 p.ct. preference 8½, 5 p.ct. debentures 47½, 48, South Metropolitan 106½, 3 p.ct. debenture 61, Tottenham "B" 94. Supplementary prices, Hartlepool 5 p.ct. maximum 83½.

On Wednesday, British 116, Commercial 97, 99, Continental Union 28, European 8⅝, Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 4½d., 3½ p.ct. maximum 62½, 4 p.ct. preference 78½, 5 p.ct. debenture 99½, Imperial Continental 150½, Primitiva 20s. 6d., 20s. 7½d., South Metropolitan 106½, 107½. Supplementary prices, Ottoman 7 p.ct. preference 5s.

On Thursday, Commercial *ex* div., Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 4½d., 3 p.ct. debenture 60⅜, Imperial Continental 150, 151½, Primitiva 20s. 6d., 20s. 9d., South Metropolitan 103½, 104 *ex* div., Swansea 7 p.ct. preference 101⅜, 101½, Tottenham 4 p.ct. debenture 77½, Uxbridge 5 p.ct. preference 85. Supplementary prices, Cheltenham 5 p.ct. maximum 70½, 71, Hartlepool 5 p.ct. maximum 84.

On Friday, Alliance and Dublin 97, 97½, Bombay 22s. 3d., 22s. 7½d., Commercial 97½, European 8⅝, Gas Light and Coke 19s., 19s. 0⅜d., 19s. 1½d., 19s. 3d., 3½ p.ct. maximum 64, Imperial Continental 150½, 152, Newcastle 3½ p.ct. debenture 67, Oriental 116½, Primitiva 20s. 4½d., 20s. 6d., 20s. 10½d., South Metropolitan 104, 104¼, 3 p.ct. debenture 60. Supplementary prices, Kingston-upon-Thames 101, 101½, Mid-Kent 72s. 6d.

In Lombard Street loans were in good demand. Fresh accommodation commanded 3½ p.ct. up to 3¾ p.ct., and existing loans were renewed at similar rates. A firmer tendency was reflected in the discount market, and the Government was less favoured in the average rate at which Treasury Bills were allotted—£4 3s. 6·04d., against £4 2s. 11·17d. p.ct. the previous week—and, moreover, the full amount offered was not allotted.

The American exchange reacted slightly, and closed ⅝ c. lower at 4.87⅛; Italian lire were dearer at 92.09½; but Dutch florins depreciated to 12.12⅛. Belgas were lower at 35.03, and German marks left off at 20.43½. There was no change in francs.

Both India and China were offering silver, and the price declined to 26⅞d. per oz. Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	Name.	Quotations. Feb. 24.	Rise or Fall on Week.	Transaction Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb 9	5	5	Aldershot 5 p.c. max. C.	70—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,561,888	,,	Sept. 29	7	7	Alliance & Dublin Ord.	95—99	..	97—97½
274,000	,,	Jan. 12	4	4	Do. 4 p.c. Deb.	64—67	..	..
523,854	,,	Aug. 25	—	7	Barnet Ord. 7 p.c.	107—110	..	..
800,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/6—22/6	..	22/3—22/7½
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
600,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	..
80,000	Stk.	Jan. 12	3	3	Do. 3 p.c. Deb.	56—59	..	..
163,925	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
857,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	112—115	..	..
341,880	,,	,,	—	6/8/6½	Do. 5 p.c. Con.	100—103	..	..
1,387,500	,,	Feb. 23	5	5	Bristol 5 p.c. max.	67½—68½a*	−2	116
855,000	,,	Sept. 29	7	8	British Ord.	112—115	..	..
100,000	,,	Dec. 22	7	7	Do. 7 p.c. Pref.	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—75	..	..
300,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	93—96	..	..
100,000	10	Nov. 24	8	6	Cape Town, Ltd.	8—9	..	..
100,000	10	Oct 27	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 22	4½	4½	Do. 4½ p.c. Deb.	72—77	..	..
888,960	,,	Feb. 23	6	6	Cardiff Con. Ord.	98—101*	−2	101
387,960	,,	Jan. 12	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
187,150	,,	Feb. 23	5	6½	Chester 5 p.c. Ord.	84½—89½b*	−2½	..
79,195	1	Oct. 13	†2/-	†2/-	Colombo Ltd. Ord.	31/—33/-	..	..
34,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
231,490	1	Oct. 13	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/—26/-	..	..
178,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
3,079,289	Stk.	Feb. 23	5	7	Commercial Ord.	97—100*	..	97—100
475,000	,,	Dec. 22	8	8	Do 8 p.c. Deb.	57—60	..	..
800,000	,,	Sept. 29	†1	†1	Continental Union, Ltd.	28—33	..	28
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	90—95	..	..
287,560	,,	Aug. 11	6½	6½	Croydon sliding scale	102—105	..	103½—104½
406,100	,,	,,	5	5	Do. max. div.	83—86	..	..
499,270	,,	Aug. 25	9	6	Derby Con.	103—105e	..	..
55,000	,,	Dec. 22	4	4	Do. Deb.	71—78e	..	..
309,000	,,	Aug. 25	5	5	East Hull Ord. 5 p.c.	78—81	..	..
60,000	,,	Dec. 22	5	5	Eastbourne 5 p.c. Deb.	90 95	..	83½—85
1,009,180	10	S pt. 29	†3	†4	European, Ltd.	8½ 9½	..	9½
13,703,480	Stk.	Feb. 9	5	5/1/4	Gas Light & Coke 4 p.c. Ord.	19/—19/8	−/1½	19/—19/4½
2,600,000	,,	,,	8½	8½	Do. 8½ p.c. max.	62—64	+1	62½—64
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	78½—79½
5,609,630	,,	Dec. 22	3	3	Do. 3 p.c. Con. Deb.	60—62	..	60½—60⅝
181,815	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	102 105	+1	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	+½	99½
49,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
89,500	,,	Aug 25	6½	6½	Hastings & St L. 5 p.c. Conv	89—92	..	..
358,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	70 -73	..	..
70,000	10	Oct. 13	†10	†10	Hongkong & China, Ltd.	12½—13½	..	..
173,300	Stk.	Aug. 25	5	5	Hornsey Con. 3½ p.c.	76—79	..	150—152
1,976,000	,,	Nov. 10	10	10	Imperial Continental Cap.	149—152	..	..
223,180	,,	Feb. 9	3½	3½	Do. 3½ p.c. Red. Deb.	67—69	..	..
285,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	96—99	..	..
2,145,907	,,	Feb. 23	5½	5½	Liverpool 5 p.c. Ord.	86½ 87½b*	−2½	..
600,000	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
165,736	,,	Feb. 23	9	8	Maidstone 5 p.c. Cap.	104—109*	−3	..
15,000	5	Dec. 22	†7	†8	Malta & Mediterranean	5½—5⅝	..	..
641,930	Stk.	Nov. 24	†7	†8	Montevideo, Ltd.	92 94	..	..
2,061,315	,,	July 28	5	5	Newcastle & Gateshead Con.	16/3 - 16/9d	..	..
960,929	,,	,,	4	4	Do. 4 p.c. Pref.	67½ 6-4d	..	..
691,705	,,	June 23	3½	3½	Do. 3½ p.c. Deb.	66½—67½d	..	..
131,785	,,	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con.	93—96	..	116½
800,000	,,	Nov. 24	7	9	Oriental, Ltd.	116—121	..	..
188,120	,,	Dec. 22	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Feb. 23	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	99—102*	−3	..
296,732	,,	,,	5	5	Do. 5 p.c. max.	74—77*	−2	..
2,334,464	1	—	—	—	Primitiva Ord.	20/3—21/3	−.3	20/4½—21/-
247,500	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	92—96	..	..
695,000	Stk.	Jan. 26	4	4	Do. 4 p.c. Red. Deb 1911	74—76	..	..
422,188	,,	Dec. 22	4	4	Do. 4 p.c. Cons. Deb.	74—76	..	..
180,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref.	8½—8⅝	..	8⅝
135,000	50	Jan. 3	5	5	Do. 5 p.c. Red Deb.	46—48	..	47½—48
270,000	Stk.	Sept. 8	5⅜	5⅜	Sheffield A	102—104e	..	..
419,968	,,	,,	5⅜	5⅜	Do. B	102—104e	..	..
1,047,000	,,	,,	5⅜	5⅜	Do. C	102—104e	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,909,895	Stk.	Feb 23	5	7½	South Met. Ord.	103—105*	−3	103½—107½
500,000	,,	,,	—	6	Do. 6 p.c. Irred. Pf.	108—111*	−2	..
1,896,448	,,	Jan. 12	8	8	Do. 8 p.c. Deb.	59—62	..	60—61
734,000	,,	Sept 8	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	..
91,500	,,	Aug. 11	8½	8½	South Shields Con.	111—113d	..	..
1,343,796	,,	Feb. 23	6½	6½	South Suburban Ord. 6 p.c.	103—106*	−2	..
868,837	,,	Dec. 22	5	5	Do. 5 p.c. Deb.	93 96	..	..
847,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max.	79—82	..	..
121,275	,,	Dec. 22	4	4	Do. 4 p.c. Deb.	72—75	..	..
950,000	,,	Aug 25	7	7	Swansea 7 p.c Red. Pref.	103—106	..	101½—104½
300,000	,,	Dec. 22	6½	6½	Do. 6½ p.c. Red. Deb.	90—102	..	..
120,000	,,	Feb. 22	7½	7½	Tottenham District A 5 p.c.	107—112*	−3	..
882,275	,,	,,	6½	6½	Do. B 5½ p.c.	90—93*	−2	88—94
180,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	95—98*	−2	..
181,265	,,	Dec. 8	4	4	Do. 4 p.c. Deb.	74—77	..	77½
258,351	,,	Sept. 21	5	5	Tynemouth Con. and New	81- 83d	..	..
289,094	,,	Aug. 25	5½	5½	Uxbridge, Maidenhead, & Wycombe 5 p.c	90—93	..	85
98,880	,,	,,	5	5	Do 5 p.c. pref.	85—90	..	
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	July 14	8½	8½	Wandsworth A 5 p.c.	130—135	+3	..
255,698	,,	,,	7	7	Do. B 3½ p.c.	110—115	+3	..
432,535	,,	,,	5/19/0	5/19/0	Do. C and New	97—102	+3	..
862,000	,,	,,	6½	6½	Do. Wimbledon 5 p.c.	105—110	+3	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	112—117	+2	..
300,000	,,	,,	5	5	Do. 5 p.c. Pref	88—93	..	..
88,416	,,	Dec. 22	3	3	Do. 3 p.c. Deb.	56—59	..	..
284,748	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..

Quotations at :—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

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See "JOURNAL," February 1, p. 280.

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